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C O U R S E  
O F  
E X P E R I M E N T A L  
A G R I C U L T U R E.  
V O L. II.



# A C O U R S E O F E X P E R I M E N T A L G R I C U L T U R E

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An exact REGISTER of all the BUSINESS  
Transacted during FIVE YEARS  
On near THREE HUNDRED ACRES of various Soils;

Including a Variety of EXPERIMENTS on

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Both in the OLD and New Methods;

The Raising large CROPS of TURNEPS, CABBAGES, CARROTS, POTATOES, &c. and  
several Plants not usually cultivated, as Food for Cattle; and the Application  
of them to Feeding or Fattening of Oxen, Cows, Horses, Hogs, Sheep, &c.

A L S O

The Management of the Artificial GRASSES,  
particularly Clover, Lucerne, Sainfoine,  
Burnet &c. in the Broad-cast, Dulling,  
and Transplanting Methods; and their Uses  
in Feeding several Sorts of Cattle.

The Culture of Madder.

A particular COMPARISON between the OLD  
and New Husbandry.

The Management of PASTURE LANDS.

On PLOUGHING, HARROWING, and other  
Operations of Tillage, relative to the Sea-  
son, Number, Depth, &c.

On the general FEEDING and FATTENING  
of CATTLE on various Articles of Food;  
the Expenses, Profit, Quantity, &c.

The IMPLEMENTS of HUSBANDRY, their  
Defects, Improvements, &c.

With other SUBJECTS

Of Importance to the COUNTRY GENTLEMAN and FARMER.

THE WHOLE

Stated in near TWO THOUSAND ORIGINAL EXPERIMENTS.

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IN TWO VOLUMES.

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V O L. II.

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L O N D O N,

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E X P E R I M E N T A L  
A G R I C U L T U R E.  
B O O K II.

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S E C T. V.

M I S C E L L A N E O U S    E X P E R I M E N T S.

**T**HOSE gentlemen who are situated on a heavy or a moist soil, and make experimental husbandry their business, should by no means omit forming many trials on beans. They are a very important crop, that requires a much more accurate attention than common farmers, in any part of the kingdom, bestow upon them. From the beginning of my practice I found their produce on my poor loams much more abundant, when well treated, than most other crops: this consequently engaged me to vary my experiments on them; which I did to a greater extent than I think needful to register in these papers: some of my trials could not properly be arranged under any of the preceding heads. Such I shall now insert by themselves.

E X P E R I M E N T N<sup>o</sup>. I.

That I might discover the effect of the utmost perfection of both tillage and manure, I marked a square perch in field L\*, in October 1764, dug it three feet deep. The first spit was the common field loam, formed in a long succession of ages, by tillage, manure, crops, and the atmosphere; the second was our brick earth loam, more adhesive than the surface: and the third and fourth were white clay, with some small chalk stones in it: the digging, these different strata were very well mixed together, with bushels of rotten farm-yard dung: the surface being laid on the high sharp ridge:



ridge; that dressing is the proportion of 53 loads per acre, 30 bushels each. In February following spread on it 2 bushels of coal ashes, and dug it down to a level, and drilled it with beans in equally distant rows, 2 feet asunder: they came up with great luxuriance, as may be imagined, and flourished away throughout the season with a vigour that surprised me, considering the extreme drought. They were hand-hoed five times; and running up to a vast height, I cut off the tops before any blossoms appeared. My bailey told me they would be *laid* like wheat or barley, but he was mistaken, for they kept their erect posture throughout the season, giving no signs of falling; they podded very favourably, were reaped the beginning of September. Produce 23 quarts, or *per* acre 14 qrs. 2 bushels and 2 pecks.

This produce is immense, and infinitely beyond what I could possibly conceive, especially as the season was extremely unfavourable to the general production of this crop. This proves that bad seasons are much the worst to bad farmers; and that you may controul the effect even of the worst by spirited exertions of good husbandry. A lesson of great consequence, however improper it may be to act on such an expensive plan as this. Fourteen quarters *per* acre are such an unusual product, that I think it plain from the amount, that our farmers, who principally cultivate beans, do by no means give them fair play. They have the power of pushing their roots around them far and near when planted in very rich and well pulverized land; and their stalks are of such a size, and so strong, that nothing can *lay* them, which is the evil of corn crops in highly manured land: Would it not therefore be very advisable to manure richly for beans, as a crop that would probably pay for it as well as any?

The expence of cultivating an acre in the manner of this perch, is about 24*l*. and the value of the crop better than twenty guineas, which, considering the preparation for future crops, may justly be esteemed as *profitable*; a circumstance few would believe possible from a mere review of the culture. But I am strongly of opinion, that there are many plants which would answer well to cultivate in this perfect manner, but men are fearful of great expences.

#### EXPERIMENT N<sup>o</sup>. 2.

Marked a square perch in field L\*, in September 1765, dug it four spits deep, or 3 feet, turning in and equally mixing 10 bushels of rotten farm-yard dung, leaving the surface on the high sharp ridge. In February spread one bushel of coal ashes and one bushel of poultry dung on the surface, and dug down the ridges, drilled it with tick beans, in treble rows, 1 foot asunder, with 3 feet intervals. Nothing could carry a more flourishing appearance than this perch: the beans grew away finely, and yet with a colour perfectly healthy. They were hand-hoed four times, weeded twice, and the intervals dug, in imitation of horse-hoeing, four times, the clods

clods being each time well broken; and the surface left in a neat garden-like condition. The tops of the beans were cut off on the first appearance of a blossom: reaped the end of September; product 25 quarts, 1 pint and 1 half, or *per* acre 16 quarters and 3 pecks.

{ This vast produce, which I suppose was never exceeded, shews what great things may be effected by the perfection of husbandry. It is evident that beans cannot well receive too much attention, both in respect of manuring and tillage; and that you may bestow on them a much greater portion of the former than on any other crop of corn or pulse; all other sorts, when they rise with remarkable luxuriance, fall to the ground before harvest from the weakness of the straw; but beans have such strong stalks, and so proportioned to the produce of pods and corn (some of the stems are of a vast size) that they are scarcely ever subject to that fatal malady — which renders them, together with the quality of yielding an immense product in return for a rich preparation—as proper as any common crop to be richly dunged for, as a preparation for corn: a course of husbandry which I am confident would answer greatly, though no where practised, that I know of.

The expence *per* acre of cultivating land in the manner of this experiment, would be above 20*l*. The value of this product is 27*l*. 7*s*. which I must be allowed to think a most extraordinary return, and to pay an immense profit: the loss the first year as a preparation for future crops I need not remark is prodigiously advantageous. I have not a doubt but the profit of thus preparing a whole farm, would be extremely great; but every body has too much land for really correct and spirited husbandry. The staple of this land is at once made 3 feet deep: what a space for the roots of all crops to spread in!—and to the bottom of which they will find manure!

#### EXPERIMENT N<sup>o</sup>. 3.

Marked a piece of 6 square perches of barley stubble, in field L\*, in October 1764. Ploughed it on to the ridge: in March 1765 ploughed and drilled it with beans, in equally distant rows, 2 feet asunder. Hand-hoed them thrice in the season; reaped in August: the product 3 pecks and 6 quarts, or *per* acre 3 quarters 1 bushel.—This little trial I had formed for another purpose; but changing my mind after this harvest, I appropriated the piece to try the culture of beans, year after year successively, on the same land, to see if the crops would degenerate, and in what degree.

Ploughed up the stubble in October, and water-furrowed it. In February 1766, ploughed it again, and drilled it in equally distant rows 2 feet asunder; hand-hoed them four times, and hand-weeded them once: cut the tops off just as going into blossom. Produce 5 pecks, 2 quarts, or *per* acre 4 quarters, 3 bushels.

Ploughed up the stubble in November, and water-furrowed it as before ; and in February 1767, ploughed and sowed it with beans broadcast. The land was very clean, and in good order, so that the beans came up well, and carried a good appearance. They were hand-hoed thrice : the tops cut as before, and reaped in September. Produce 6 pecks, or *per* acre 5 quarters.

Had I staid on the farm, I should have continued the experiment several years longer ; — but there is reason to imagine, from the result of these three, that the oftener you sow hoeing crops, the better for the land, and produce ; — and that it matters not their being every year the same sort : These three improved each year, which was certainly owing to the soil being kept so remarkably clean, as it must be by a succession of hoed crops : and it is of some consequence to know that beans will answer well every year on the same land ; for there may be, and certainly are, numerous tracts that have been much run out of heart by slovenly tenants, which might very advantageously be treated in this manner for several years, and by that means brought not only into good heart, but also made as clean as a garden. And the general tenor of the preceding experiments proves, that very few crops can answer better ; so that a husbandman, by such a plan, will greatly clean and ameliorate his farm, and make a good profit at the same time.

#### EXPERIMENT N°. 4.

Marked two square perches of land in field L\*, that had been twice ploughed, and drilled them in February 1766, each with  $\frac{3}{5}$ ths of a pint of beans, in equally distant rows, two feet asunder. Drilled one with the common horse bean, and the other with the tick bean : which I did to see what difference there would be in the product. They were hand-hoed thrice and equally, reaped and threshed in September ; produce of the horse beans 5 quarts, or *per* acre 3 qrs. 1 bushel ; of the tick beans 6 quarts 1 pint, or *per* acre 4 qrs. 2 pecks. Superiority of the latter 7 bushels and 2 pecks.

This is considerable ; and shews evidently that the tick bean yields much the best ; the price is also higher than of the common sort : which considerations are of such moment, that the farmers (at least that occupy such soils as mine) should on all accounts make choice of them : I have no doubt but they will in general be found much superior to the others.

#### EXPERIMENT N°. 5.

Marked two square perches, in February 1767, in field L\*, that had been twice ploughed, and drilled them in equally distant rows, 2 feet asunder, with horse and tick beans for comparison. Hand-hoed them thrice :

				£.	B.	P.
Of the tick beans 7 quarts, or <i>per</i> acre,	—	—		4	3	0
Of the horse beans 5 quarts and half a pint, or <i>per</i> acre,	—	—		3	2	1
Superiority of the former,	—	—	—	1	0	3

From the general observation I have made, there is little doubt but the comparison between these sorts of beans will always turn out pretty much in the same manner: the tick sort will ever be found the superior. Hence I shall venture to recommend them to all who are curious in the culture of beans. The superiority of a quarter *per* acre, which is from 30 s. to 34 s. is very great, being double the rent of good land. What the botanical distinction of these beans is I know not, but the sort which in this country are called *tick*, are half as large again as the common speckled horse bean, and of a light colour. They were recommended to me as a sort that yielded better than the common ones.

## C H A P. III.

### O F T A R E S.

**T**HIS pulse is not of general use in every part of the kingdom; and its culture is extremely various. In some places they cultivate it for the seed—in others to mow green for horses and other cattle.—In some they use it chiefly for hay; and in others for spring seed of sheep and lambs: but notwithstanding the uses of it being so various, yet it nowhere forms a crop regularly in a course; from which one would suppose the merit of it not great; certainly a false judgment.

There are two sorts of them. The winter and the spring tare: the latter is that which I have used—not from knowing it to be superior to the other sort, but from the difficulty in this country of getting the true winter tare. I sowed for it several times, but found that I had been deceived in the seed; not from the whole crop ever dying, but from their succeeding much worse than when sowed in the spring. Tares are called also *thatches*, *fetches*, *wetches*, &c. &c. at least I know not of any distinctions between these crops.

In this neighbourhood they are very seldom cultivated for the seed or for feeding; but generally for hay. The farmers mow them when in full blossom, or when the pod is just beginning to form; the latter is a bad custom undoubtedly: for two reasons. First, the tares then draw too much virtue from the land. Secondly, they make not such good hay as when the stalks and leaves are in the highest state of succulency.

#### E X P E R I M E N T N<sup>o</sup> I.

Culture, expences, and produce, of half an acre, field M\*, 1764.

#### C U L T U R E.

This piece received the first ploughing in October 1763. Before I had formed any regular design of collecting experiments, in order to lay them before the public, I had a strong inclination of trying the culture of every thing I heard of. My bailey no sooner named tares, than I determined, as soon as possible, to have a piece of them: 1763, however, slipped me without

without my executing the idea; but I marked this half acre, early in 1764, for the purpose. It was ploughed on the flat:—I sowed 6 pecks of seed in March over the land, and ploughed them in, harrowing it fine: they came up very well and thickly; were mown in June, when in blossom, and made into hay; which, when well made, weighed 1 ton 5 cwt. and was valued, according to the price of the country, at 30 s. a ton, so weighed. The weather was favourable, so that they received no damage;—a circumstance of more consequence to tares than to common hay. Rain damages them more; and when no rain falls on them, they are more valuable than any common hay.

EXPENCES.					£.	s.	d.
Two ploughings,	—	—	—	—	0	1	0
Harroving,	—	—	—	—	0	0	1½
Seed,	—	—	—	—	0	4	6
Sowing,	—	—	—	—	0	0	1½
Mowing,	—	—	—	—	0	0	8
Making, &c.	—	—	—	—	0	1	4
					0	7	3
Rent, &c.	—	—	—	—	0	8	6
					0	15	9
PRODUCE.					£.	s.	d.
25 cwt. at 30 s.	—	—	—	—	117	6	
Expences,	—	—	—	—	0	15	9
Profit,	—	—	—	—	1	1	9
Ploughing,	—	—	—	0 1 6	}	0 1 11½	
Harroving,	—	—	—	0 0 3			
Carting,	—	—	—	0 0 2¼			
Clear profit 1 l. 19 s. 6 ½ d. per acre,					1	19	9½

## OBSERVATIONS.

The profit of this crop is considerable, and will greatly encourage me to cultivate a field every year: the expences are very low, which is a great advantage when the husbandry is good. And another point of great consequence is, the benefit all our farmers insist they are of to the ground. They never fail sowing barley after them, and seldom of gaining good crops; for the tares being mown before they seed, do not draw the ground; but the very thick shade they yield, mellows it to a great degree: the stubble of this half acre broke up after the tares quite in a crumbly state; so that my bailey advised turneps being harrowed in; but I did not follow the advice, as I designed it for other purposes. There are numerous advantages

vantages attending this culture, which, I think, cannot fail of rendering it more worthy of attention than is given it in many places. First, the expences are very low, and yet the husbandry good; two circumstances that do not very often unite. Second, the crop is an ameliorating one, leaving the land in better order than it was found. Third, it is food for cattle, and consequently increases the general stock of manure. Fourth, the immediate profit is considerable, 40s. an acre, clear, not being very common even from corn.

## EXPERIMENT N° 2.

Culture, expences, and produce, of three acres, field Z, 1765.

## CULTURE.

This piece yielded turneps in 1759; Barley in 1760; Clover in 1761; Oats in 1762; Was fallowed in 1763; Wheat in 1764, the stubble of which was ploughed up in January. The second earth was given the 19th of April; and on the 4th of May ploughed, sowed with 6 bushels of tares, and harrowed. Mowed the 15th of August; turned the 20th and 24th; carried and stacked the 26th and 28th.

## EXPENCES.

				£.	s.	d.
Three ploughings,	—	—	—	0	9	0
Harrowing,	—	—	—	0	0	6
Seed,	—	—	—	0	15	6
Sowing,	—	—	—	0	0	0
Weeding,	—	—	—	0	2	6
Mowing,	—	—	—	0	3	6
Making and stacking,	—	—	—	0	9	0
				2	0	9
Rent, &c.	—	—	—	2	11	0
				4	11	9

## PRODUCE.

				£.	s.	d.
4 tons dry in the winter, at 3l.	—	—	—	12	0	0
Expences,	—	—	—	4	11	9
Profit,	—	—	—	7	8	3
Ploughing,	—	—	—	0	9	0
Harrowing,	—	—	—	0	0	6½
Carting,	—	—	—	0	2	6
				0	12	0½
Clear profit 2l. 5s. 4d. ½ per acre.	—	—	—	6	16	2½

## OBSERVATIONS.

The hay is charged at the price of common hay; some of which I bought at that rate. The crop would have been far greater, had it been sown much earlier: some other pieces I had this year, that were earlier sown, succeeding much better. The profit of the crop is evidently very great, and exceeds that of most spring corn ones; though it is acknowledged that they exhaust the land more, and that the expences attending them are vastly higher. In such farms as possess not a sufficiency of meadow and pasture land, they must be of incomparable utility: and to all, indeed, that are situated in a country where hay is scarce or dear.—I shall recommend them as a very profitable crop to such farmers as are fond of raising by all means plenty of food for cattle.

EXPERIMENT N<sup>o</sup> 3.

Culture, expences, and produce, of half an acre, field T, 1765.

## CULTURE.

Received the first ploughing in November, 1764, when it was thrown into the ridge, and water-furrowed: in March ploughed down the ridges, and harrowed in 6 pecks of tares, and water-furrowed the land again. The thistles were once hooked out: mowed them the first week in July. Produce 1 ton 2 cwt. 1-half.

## EXPENCES.

					£.	s.	d.
Two ploughings,	—	—	—	—	0	1	0
Water-furrowing,	—	—	—	—	0	0	5
Seed,	—	—	—	—	0	3	9
Sowing,	—	—	—	—	0	0	11
Thiffling,	—	—	—	—	0	0	9
Mowing,	—	—	—	—	0	0	8
Making, carting, &c.	—	—	—	—	0	1	6
					<hr/>		
					0	8	2½
Rent, &c.	—	—	—	—	0	8	6
					<hr/>		
					0	16	8½

## PRODUCE.

					£.	s.	d.
1 ton 2 1-half cwt. at 3 <i>l</i> .	—	—	—	—	3	7	6
Expences,	—	—	—	—	0	16	8½
					<hr/>		
Profit,	—	—	—	—	2	10	9½



Brought over,	—	—	—	—	—	2	10	9½
Ploughing,	—	—	—	—	0	1	0	
Harrowing,	—	—	—	—	0	0	2½	
Carting,	—	—	—	—	0	0	5	
								0. 1 7½
Clear profit, 4 <i>l.</i> 18 <i>s.</i> 4 <i>d.</i> ½ <i>per</i> acre,	—	—	—	—	—	2	9	2½

## O B S E R V A T I O N S.

Hay yielded so extravagant a price this winter, that the profit of tares rises to great sums. No barley or oats upon this land, nor wheat itself, would have produced any thing like this profit. At the same time that the crop is so extremely advantageous, in the mere product, it is equally so as a preparation for any other. The soil of this half acre broke up remarkably mellow, and quite in a state of natural pulverization; so that tares may be depended on as an excellent preparation for barley or oats; which in many farms is a very important object.

E X P E R I M E N T N<sup>o</sup> 4.

Culture, expences, and produce, of a rood, field L\*, 1765.

## C U L T U R E.

Yielded barley in 1764; the stubble of which (clover was sown with it, but it failed) was ploughed up in November; and the piece water-furrowed. In February stirred it again, and again water-furrowed it. In March manured it with 3 loads of rotten farm-yard dung, and ploughed it in, harrowing in 2 pecks of seed tares; and then water-furrowed for the third time. They came up, and flourished very well through the season, notwithstanding the drought. Were mown the beginning of July. Produce 14 cwt. of hay.

## E X P E N C E S.

					£.	s.	d.
Three ploughings,	—	—	—	—	0	3	0
Water-furrowing,	—	—	—	—	0	1	0
Harrowing,	—	—	—	—	0	0	2
Manuring,	—	—	—	—	0	3	0
Seed,	—	—	—	—	0	5	0
Sowing,	—	—	—	—	0	0	3
Mowing,	—	—	—	—	0	1	3
Making, &c.	—	—	—	—	0	3	0
							0 16 8
Rent, &c.	—	—	—	—	0	17	0
							1 13 8

P R O-

P R O D U C E.				£.	s.	d.
2 tons 16 cwt. hay at 3/.	—	—	—	8	8	0
Expences,	—	—	—	1	13	8
Profit,	—	—	—	6	14	4
Ploughing,	—	—	—	0	3	0
Harrowing,	—	—	—	0	0	2½
Manuring,	—	—	—	0	4	6
Carting hay,	—	—	—	0	6	10
				0	8	6½
Clear profit,	—	—	—	6	5	9½

## O B S E R V A T I O N S.

This crop I consider as a very extraordinary one. Six guineas clear profit are very seldom gained from corn in this neighbourhood: not one crop of wheat in five hundred pays any such profit. Indeed it arises from the high price which hay yielded, which may be thought accidental: but such high prices ought certainly to be included in all accounts, as the average of any given number of years is founded on all rates. Why not charge the real price of hay, as well as of wheat, &c. &c? 3*l.* per ton for hay is not higher than 50*s.* a quarter for wheat, which is a price that has been known.

But the mere amount of the value of the produce is not the only circumstance capitally in favour of this crop; the land is prepared by it for any other in a very rich manner: for the thick shade of a crop that is cut before it feeds, so thick as 56 cwt. of hay *per* acre, of so succulent a nature as tares, is as rich as a common manuring. This piece actually bernelled under the plough like an old dunghill, it was in such a state of fermentation.

The great produce of this trial, and the richness of the preparation for any other crop, proves how expedient it is to manure well for tares; you thereby ensure a crop that will amply pay the expence; and at the same time prepare better for wheat or barley, than if the same manure was laid on directly for them; such crops succeeding great ones of tares being no comparison cleaner than receiving the dung at first hand. This is a husbandry which I cannot fail recommending to all farmers solicitous for profit from clean fields.

E X P E R I M E N T N<sup>o</sup> 5.

Culture, expences, and produce, of two acres, field T, 1766.

## C U L T U R E.

Yielded oats in 1765; the stubble not ploughed up till the 13th of March; the 20th and 21st harrowed in 4 bushels of tares. This was by

no means good husbandry : the stubble ought to have received a ploughing in October; but the land worked remarkably crumbling and mellow, so that I had hopes of a good crop notwithstanding my bad husbandry. Some thistles that came up were cut the end of June : August the 6th mowed them ; turned the 9th, and carried the 12th, no rain having fallen. Product 3 tons 6 cwt.

EXPENCES.					£.	s.	d.
One ploughing,	—	—	—	—	0	2	0
Harrowing,	—	—	—	—	0	0	6
Seed,	—	—	—	—	0	17	0
Sowing,	—	—	—	—	0	0	6
Thiftling,	—	—	—	—	0	2	6
Mowing,	—	—	—	—	0	3	4
Making, &c.	—	—	—	—	0	3	0
					<hr/>		
					1	8	10
Rent, &c.	—	—	—	—	1	14	0
					<hr/>		
					3	2	10
PRODUCE.					£.	s.	d.
3 tons 6 cwt. at 45s.	—	—	—	—	7	8	6
Expences,	—	—	—	—	3	2	10
					<hr/>		
Profit,	—	—	—	—	4	5	8
Ploughing,	—	—	—	0 4 9 $\frac{1}{2}$			
Harrowing,	—	—	—	0 1 6			
Carting,	—	—	—	0 1 8			
					<hr/>		
					0	7	11 $\frac{1}{2}$
					<hr/>		
Clear profit, 1l. 18s. 10d. $\frac{1}{2}$ per acre,	—	—	—	—	3	17	8 $\frac{1}{2}$

## OBSERVATIONS.

This profit is considerable ; and if the very slight preparation for the crop be taken into the account, will be found much more advantageous than any crop of corn that could in such circumstances have been sown. I have every day more reason to think, that if our farmers would substitute tares for hay, in the room of their after crops of corn, they would find them abundantly more advantageous. Corn is universally known to be an impoverisher of the soil : whereas all the leguminous tribe are equally well known to draw a considerable portion of their nourishment from the atmosphere : even when they perfect their seed, there is no comparison between any crop which succeeds them, or corn : but when mown in full succulency, before the seed begins to form, there can be no doubt

but the land is much benefited by them. The thick shade they afford not only kills a vast many weeds, but breeds that putrefactive fermentation in the soil, which is known to be of such benefit to all succeeding crops : and the circumstance of yielding so much food for cattle is another point of the first importance. It is the food of cattle that improves a farm, by enabling the farmer to raise large quantities of dung.

## EXPERIMENT N° 6.

Culture, expences, and produce, of two acres, field T, 1766.

## CULTURE.

The stubble of these two acres was ploughed up in November 1765, and water-furrowed. March the 13th, &c. ploughed it the second time; and upon this tillage I must observe, that the two acres of EXPERIMENT N° 5. broke up this day, for the first ploughing, in a more crumbling mellow state than this piece which was ploughed before winter : I only mention the circumstance, but by no means as a proof, that the practice of autumnal ploughing is wrong : for as far as opinion goes, I am clear it must be right. This ploughing turned in 24 loads of compost on the two acres, consisting of equal parts of farm-yard dung, ditch-earth, clay, and ant-hills, that had been twice mixed. Harrowed in 6 bushels of tares. They received one thiffling, were cut in August, and carried without having received any rain. Product 4 tons.

## EXPENCES.

				£.	s.	d.
Two ploughings,	—	—	—	0	4	0
Harrowing,	—	—	—	0	0	6
Water-furrowing,	—	—	—	0	0	9
Manuring,	—	—	—	0	12	6
Seed,	—	—	—	1	5	6
Sowing,	—	—	—	0	0	6
Thiffling,	—	—	—	0	3	0
Mowing,	—	—	—	0	3	4
Making, &c.	—	—	—	0	3	0
				<hr/>		
				2	13	1
Rent, &c.	—	—	—	1	14	0
				<hr/>		
				4	7	1

## PRODUCE.

				£.	s.	d.
4 tons at 45 s.	—	—	—	9	0	0
Expences,	—	—	—	4	7	1
				<hr/>		
Profit,	—	—	—	4	12	11

Ploughing,

Brought over,	—	—	—	—	—	—	4	12	11	
Ploughing,	—	—	—	—	0	9	7			
Harrowing,	—	—	—	—	0	1	6			
Manuring,	—	—	—	—	0	7	0			
Carting hay,	—	—	—	—	0	1	8			
								0	19	9
Clear profit, 1 l. 16s. 7d. per acre,	—	—	—	—	—	—	—	3	13	2

## O B S E R V A T I O N S.

The expences of this crop run much higher than those of the preceding, owing to more tillage, more seed, and the manuring. Now the tares paying all expences, and leaving a profit of 36s. *per acre*, I think is very extraordinary: for the land is left in most excellent order for wheat, barley, or any thing else; and the profit in itself is by no means inconsiderable. What the effect of the extra ploughing was could not be known among other circumstances; but I have the greatest reason to think that the bushel *per acre* of seed, which I used more than before, had good effect: for the crop evidently appeared to profit by it; and was not, although manured, in any place overseeded. This observation determines me to use 3 bushels *per acre* in future. The manure, as may be supposed, much improved the crop, though it was not of the richest sort.

E X P E R I M E N T N<sup>o</sup> 7.

Culture, expences, and produce, of an acre, field T, 1766.

## C U L T U R E.

Ploughed up the oat stubble in October, and water-furrowed it. The middle of March ploughed and sowed 3 bushels of tares on it, and harrowed them in: also at the same time a cart-load of dry coal ashes thrown out of the cart with a casting shovel. They were once thiftled. Mown in August, and made without rain. Product 3½ cwt.

## E X P E N C E S.

EXPENCES.					£.	s.	d.
Two ploughings,	—		—	—	0	2	0
Water-furrowing,	—		—	—	0	0	6
Harrowing,	—		—	—	0	0	2
Manuring,	—		—	—	0	3	9
Seed,	—	—	—	—	0	12	9
Sowing,	—		—	—	0	0	3
Thittling,	—		—	—	0	1	6
Mowing,	—		—	—	0	1	8
Making, &c.	—		—	—	0	1	6
Carried over,	—		—	—	1	4	1

[illegible]

## OBSERVATIONS.

This is a considerable profit, and the crop a very good one; but it is observable, that the coal ashes were not of the least benefit. N<sup>o</sup> 5. is within 1 cwt. as good a crop; and yet that was ploughed only once: but, tillage out of the question, it is certain that the manure in this trial was not of the least advantage. I was of this opinion during the whole growth of the crop; for I could not perceive the least superiority from that difference. This should be a warning to others not to use a manure so much praised by many writers, for so improper a purpose. Tares on this soil will be nothing the better for it.

## EXPERIMENT N° 8.

Culture, expences, and produce, of four acres, field T, 1766.

## CULTURE.

Ploughed up the oat stubble in October and November, and water-furrowed it. Stirred it again in March, and harrowed in 12 bushels of tares. They rose extremely well; were thistled once; mown in August for hay, which luckily received no rain. Produce 8 tons.

EXPENCES.				£.	s.	d.
Two ploughings,	—		—	0	8	0
Harrowing,	—		—	0	1	4
Water-furrowing,	—		—	0	1	0
Seed,	—	—	—	2	11	0
Sowing,	—		—	0	1	0
Carried over,	—		—	3	2	4

Brought over,	—	—	—	—	3	2	4
Thiffling,	—	—	—	—	0	6	0
Mowing,	—	—	—	—	0	6	8
Making, &c.	—	—	—	—	0	6	0
<hr/>							
Rent, &c.	—	—	—	—	4	1	0
					3	8	0
<hr/>							
					7	9	0
<hr/>							
P R O D U C T.					£.	s.	d.
8 tons at 45s.	—	—	—	—	18	0	0
Expences,	—	—	—	—	7	9	0
<hr/>							
Profit,	—	—	—	—	10	11	0
Ploughing,	—	—	—	—	0	19	2
Harrowing,	—	—	—	—	0	3	6
Carting,	—	—	—	—	0	3	4
<hr/>							
					1	6	0
<hr/>							
Clear profit, 2l. 6s. 3d. per acre,	—	—	—	—	9	5	0

## O B S E R V A T I O N S.

This experiment is a fresh proof of the great profit of tares for hay. I have no barley or oats this year in equally common management that come near this crop in profit; and this without reckoning the very great advantage of sowing these crops, which clean and ameliorate the soil, rather than such as foul and exhaust it. This is a distinction which cannot be too well considered: for the importance, in a long run, of keeping the vegetable food on the increase in the fields which compose your farm, is prodigious. — Wheat, barley, and oats, would reduce the land almost to a *caput mortuum*; at least to such a condition, that the feed would not be reaped, when no crop would thrive in it, unless well manured. But it is not in the power of man to bring the land into the same state by any of the pulse kind, though they were left to perfect their seed; much less when mown for hay in a state of fresh succulency. Hence let me venture strongly to recommend to such farmers as are desirous of being good husbandmen, to make use of tares for hay in such fields as do not ensure them very good crops of barley and oats. This crop of tares pays me 46s. per acre, clear profit. The benefit they are of to the land, compared with the mischief done by barley or oats, cannot possibly be valued at less than 15s. One of those crops must, therefore, have paid me 3l. 1s. per acre, clear profit; or I should, on comparison with the tares, have been a loser by it: but not one crop of barley or oats in fifty pays 3l. clear, even including those that are managed in the best common manner: 5 quarters of

of barley, at 16s. are but 4*l.* *total product*; which is far enough from equalling 3*l.* *clear profit*. What then are we to think of the numerous crops of two quarters of barley and oats; and 2½? which are very common in this country. How little will such bear comparing with this of tares! Had I sown this field with barley, I should have had about 2 quarters and a half *per acre*, or about 3 of oats: I am very confident the crops would not have exceeded that proportion: the amount of them would something more than have paid expences, but would not have left 10s. an acre profit. Whereas by sowing tares, I have 46s. profit, and my land ready for wheat, with which grain I shall sow it; but after barley or oats, it must have been thrown by for a fallow: so immense is the difference between these methods!

This crop is much better than that of EXPERIMENT N<sup>o</sup> 5. They were not perfectly similar in culture; but I attribute a part of the superiority to its being somewhat more drained, by covered drains, than those two acres: a proof, if any was wanting, of the great utility of that practice.

EXPERIMENT N<sup>o</sup> 9.

Culture, expences, and produce, of three acres, field S, 1766.

## CULTURE.

Yielded oats in 1765; ploughed up the stubble the 17th of October. The middle of March ploughed it again, and harrowed in 6 bushels of tares. Thiftled them in June. Mowed them for hay the 21st of August; turned them the 26th, and carried the 29th. Produce 3 tons 16 cwt. of dry hay.

EXPENCES.				£.	s.	d.
Two ploughings,	—	—	—	—	0	6 0
Harrowing,	—	—	—	—	0	1 1½
Water-furrowing,	—	—	—	—	0	1 0
Seed,	—	—	—	—	1	5 6
Sowing,	—	—	—	—	0	0 9
Thiftling,	—	—	—	—	0	9 0
Mowing,	—	—	—	—	0	5 0
Making, &c.	—	—	—	—	0	8 0
					2	16 4½
Rent, &c.	—	—	—	—	2	11 0
					5	7 4½



P R O D U C E.						£.	s.	d.
3 tons 16 cwt. at 40s.	—	—	—	—	—	7	11	9
Expences,	—	—	—	—	—	5	7	4½
Profit,	—	—	—	—	—	2	4	4½
Ploughing,	—	—	—	—	0 14 3			
Harrowing,	—	—	—	—	0 3 4½			
Carting,	—	—	—	—	0 2 6			
						1	0	1½
Clear profit, <i>ol.</i> 8s. 1d. <i>per</i> acre,	—	—	—	—	—	1	4	3

## O B S E R V A T I O N S.

This crop is a poor one, and by no means answered my expectations : for I had before found tares so profitable, that such a crop as this I esteemed quite losing. The reason of it I attribute to underseeding ; for it was much damaged by charlock and mayweed in the places where the tares arose thinly ; but where they happened to be thick, there they totally got the better of the weeds, and would have done so all over the piece, had it been much thicker sown. Another part of the field, sown at the rate of 3 bushels *per* acre, succeeded much better.

E X P E R I M E N T N<sup>o</sup> 10.

Culture, expences, and produce, of three acres, field S, 1766.

## C U L T U R E.

Ploughed up the oat stubble the middle of October, and water-furrowed it. In March ploughed and sowed it with 9 bushels of tares. Thiftled them in June. Mowed for hay in August. Produce 4 tons 10 cwt.

E X P E N C E S.						£.	s.
Two ploughings,	—	—	—	—	—	0	6
Harrowing,	—	—	—	—	—	0	1
Water-furrowing,	—	—	—	—	—	0	1
Seed,	—	—	—	—	—	1	18
Sowing,	—	—	—	—	—	0	0
Thiftling,	—	—	—	—	—	0	9
Mowing,	—	—	—	—	—	0	5
Making, &c.	—	—	—	—	—	0	7
						3	8
Rent, &c.	—	—	—	—	—	2	11
						5	19

P R O D U C E

P R O D U C E.							£.	s.	d.
4 tons 10 cwt. at 42s. 6d.	—	—	—	—	—	—	9	11	3
Expences,	—	—	—	—	—	—	5	19	7½
Profit,	—	—	—	—	—	—	3	11	7½
Ploughing,	—	—	—	—	—	0 14 3			
Harrowing,	—	—	—	—	—	0 3 4½			
Carting,	—	—	—	—	—	0 2 6			
							1	0	1½
Clear profit ol. 17s. 2d. per acre,	—	—	—	—	—	—	2	11	6

## O B S E R V A T I O N S.

This is a considerable profit from a field manifestly in bad order;—indeed much worse than I thought it: and the land is certainly left cleaner than the tares found it. Had barley or oats been sown, the loss would not have been far short of this profit. The quantity of 3 bushels of seed tares appears in this trial to be much more beneficial than two, the quantity used in the preceding experiment; at least in land that is not quite clean, or in pretty good heart; if the soil is in very good order, perhaps a less quantity would be as well.

E X P E R I M E N T N<sup>O</sup> II.

Culture, expences, and produce, of one acre, field S, 1766.

## C U L T U R E.

Ploughed up the oat stubble in October: stirred it again in March, and harrowed ~~in~~ 2 bushels of tares. They were once thistled: mown for seed the 1st of October: carried the 13th. This is very late, but they were not fit to cut before. Produce 12 bushels 1 peck.

E X P E N C E S.							£.	s.	d.
Two ploughings,	—	—	—	—	—	—	0	2	0
Harrowing,	—	—	—	—	—	—	0	0	4½
Water-furrowing,	—	—	—	—	—	—	0	0	3
Seed,	—	—	—	—	—	—	0	8	6
Sowing,	—	—	—	—	—	—	0	0	3
Thistling,	—	—	—	—	—	—	0	3	0
Mowing,	—	—	—	—	—	—	0	1	8
Harvesting,	—	—	—	—	—	—	0	1	8
Threshing,	—	—	—	—	—	—	0	3	0
							1	0	8½
Rent, &c.	—	—	—	—	—	—	0	17	0
							1	17	8½

P R O D U C E.					£.	s.	d.
12 bushels at 26s.	—	—	—	—	1	19	0
Expences,	—	—	—	—	1	17	8
Profit,	—	—	—	—	0	1	3
Ploughing,	—	—	—	0 4 9			
Harrowing,	—	—	—	0 0 9			
Carting,	—	—	—	0 0 6½			
				—	0	6	0
The above profit,	—	—	—	—	0	1	3
The loss,	—	—	—	—	0	4	9

## O B S E R V A T I O N S.

The register of this experiment is of particular importance: the culture of tares in the preceding trial, in the same field, *for hay*, yields above 30 an acre profit: whereas this trial is a losing one, and is consequently a very strong lesson to whoever cultivates tares, never to let a false idea of profit occasion their adopting a conduct so palpably pernicious. I say a *false idea*, for there are many farmers who think nothing can pay them but that product which is sold *in sacks* at a market. This idea is the result (like a thousand parallel ones) of a want of money. There is a vast difference to a poor farmer, between a crop, the product of which is sold at the market without expence—and one which requires the great expence of buying cattle to consume. Tares *in a sack* want no cattle to eat them; but tares *in a stack* require cattle to be purchased to eat them, unless there be a deficiency of meadow ground for the maintenance of the standing stock. I have found by experience that nothing exceeds tare-hay for feeding oxen that are fatted on turneps. Such beasts ought always to have their racks full of hay; they will eat rather the more turneps for it—and are fat infinitely the faster. A farmer who undertakes turnep-grazing, should not begin till he has got a large stock of good hay beforehand—for cattle should never be fatted on that food alone—they should always have much hay as they will eat. But if a farmer raises tares, and does not feed his beasts, and has meadow hay for his other purposes, then he ought certainly to buy in cattle to eat such hay;—and above all things lay it down as a rule to sell none: for it is the raising large quantities of the food of cattle, and using it at home, that improves a farm. For this reason the farmer who cultivates tares should consider the great consequence of raising large quantities of valuable hay; and on no account be dazzled with the false idea of raising money easily, by letting his crop stand for seed to sell at market for by such mistaken management it is evident, by the present trial, that

he loses some shillings per acre—instead of making a profit of 1*l.* 10*s.*—besides that very important one of keeping large stocks of cattle.

EXPERIMENT N<sup>o</sup> 12.

Culture, expences, and produce, of three acres, field S, 1766.

## CULTURE.

The oat stubble ploughed up in November; and water-furrowed. In March manured it with 30 loads of compost, consisting of equal parts of farm-yard dung, ditch-earth, and ant-hills, that had been twice mixed together; then ploughed it, and harrowed in 9 bushels of tares. They grew very favourably, notwithstanding the weeds which a wet season brought up. Were thiftled once; mowed in August for hay; the produce 6 tons 2 cwt.

EXPENCES.					£.	s.	d.
Two ploughings,	—	—	—	—	0	6	0
Harrowing,	—	—	—	—	0	1	1½
Manuring,	—	—	—	—	0	11	0
Water-furrowing,	—	—	—	—	0	1	0
Seed,	—	—	—	—	1	18	3
Sowing,	—	—	—	—	0	0	9
Thiftling,	—	—	—	—	0	9	0
Mowing,	—	—	—	—	0	5	0
Making, &c.	—	—	—	—	0	7	6
					<hr/>		
Rent, &c.	—	—	—	—	3	19	7½
					<hr/>		
					2	11	0
					<hr/>		
					6	10	7½

PRODUCE.					£.	s.	d.
6 ton 2 cwt. at 45 <i>s.</i>	—	—	—	—	13	14	6
Expences,	—	—	—	—	6	10	7½
					<hr/>		
Profit,	—	—	—	—	6	3	10½
Ploughing,	—	—	—	0 14 3			
Harrowing,	—	—	—	0 3 4½			
Manuring,	—	—	—	0 16 0			
Carting,	—	—	—	0 2 6			
					<hr/>		
					1	16	1½
					<hr/>		
Clear profit, 1 <i>l.</i> 9 <i>s.</i> 3 <i>d.</i> per acre,	—	—	—	—	4	7	9

## OBSERVATIONS.

This is no trifling profit on an ameliorating crop, which pays for its manure. It is not many crops which pays 29*s.* an acre *clear*, after manuring

nuring is deducted: the profit of such an one cannot be doubted. For the advantages resulting from it are many: the land is in clean order for any other crop, the tares having completely destroyed the numerous weeds brought up by the dung; and as they do not exhaust the virtue of it as soon as laid on the land, like crops of corn, the soil is in the proper order for a crop which neither kills weeds, nor admits the killing them; which is corn. At the same time that such beneficial purposes are effected, the grand part of good husbandry is greatly promoted, viz. keeping large stocks of cattle: These are objects of the utmost importance, which are effected by the husbandry of sowing tares for hay: an husbandry which I have such repeated reasons for recommending to all good farmers.

## EXPERIMENT N° 13.

Culture, expences, and produce, of a rood, field M\*, 1766.

## CULTURE.

This piece yielded oats in complete management in 1765; the stubble of which was ploughed up in October. In February stirred it again, and for the third time in March; after which harrowed in 3 pecks of tares. Nothing could flourish in a finer manner than this crop throughout the season. It was mown for hay the end of July; the produce 17 cwt. Proportions *per acre* as follow:

EXPENCES.				£.	s.	d.
Three ploughings,	—	—	—	0	3	0
Harrowing,	—	—	—	0	0	6
Seed,	—	—	—	0	12	9
Sowing,	—	—	—	0	0	3
Mowing,	—	—	—	0	1	8
Making, &c.	—	—	—	0	1	9
				0	19	11
Rent, &c.	—	—	—	0	17	0
				1	16	11
PRODUCE.				£.	s.	d.
3 tons 8 cwt. at 45s.	—	—	—	7	13	0
Expences,	—	—	—	1	16	11
Profit,	—	—	—	5	16	1
Ploughing,	—	—	—	0	7	1 $\frac{1}{2}$
Harrowing,	—	—	—	0	1	1 $\frac{1}{2}$
Carting,	—	—	—	0	0	10
				0	9	1
Clear profit,	—	—	—	5	7	0

## O B S E R V A T I O N S.

This experiment proves very clearly the great importance of the culture of tares for hay upon good land, — or that which is well manured. The profit of more than 5*l.* per acre is an object really capital in husbandry, — and gained from an ameliorating crop, which leaves the land in most excellent order for wheat, barley, or any other crop, is altogether a height of profit that not many common productions can boast. The amount of the produce of this rood shews plainly, that such farmers as will bestow good husbandry on tares, need not be under the least apprehension for their benefit; they will most assuredly be repaid all their expences with great profit. It is of much consequence to know, that the crop admits of such a latitude of product, proportioned to the goodness of the husbandry bestowed on it, as may encourage the industrious spirited farmer to afford it the same attention, which is usually paid to others of an imaginary superiority. That he may safely, and even with a certainty of great advantage, act thus, this experiment, among others, is surely sufficient to prove.

E X P E R I M E N T N<sup>o</sup> 14.

Culture, expences, and produce, of half an acre, field M\*, 1767.

## C U L T U R E.

Yielded wheat in 1766 in the perfection of both tillage and manure. The stubble was ploughed up in October. In February stirred it for the second time, and in March gave the third ploughing; upon which harrowed in 6 pecks of tares. Nothing could flourish in a more beautiful manner than this crop, throughout the season. Mowed it for hay the middle of July. Produce 35 cwt.

## E X P E N C E S.

				£.	s.	d.
Three ploughings,	—	—	—	0	1	6
Harrowing,	—	—	—	0	0	3
Seed,	—	—	—	0	6	0
Sowing,	—	—	—	0	0	1½
Mowing,	—	—	—	0	0	10
Making, &c.	—	—	—	0	2	0
				0	10	8½
Rent, &c.	—	—	—	0	8	6
				0	19	2½

PRO-

P R O D U C E.						£.	s.	d.
35 cwt. at 42s. 6d.	—	—	—	—	—	3	14	4 $\frac{1}{2}$
Expences,	—	—	—	—	—	0	19	2 $\frac{1}{2}$
Profit,	—	—	—	—	—	2	15	2
Ploughing,	—	—	—	0	3	7 $\frac{1}{2}$		
Harrowing,	—	—	—	0	0	6 $\frac{1}{2}$		
Carting,	—	—	—	0	0	5		
				—	—	0	4	7 $\frac{1}{2}$
Clear profit, 5l. 1s. 1 $\frac{1}{2}$ d. per acre,	—	—	—	—	—	2	10	6 $\frac{1}{2}$

## O B S E R V A T I O N S.

This is a noble crop; and a fresh proof of the very considerable profit of cultivating tares for hay. We find from it that no land can be in such rich order that a farmer ought to avoid this crop from any incapability of yielding a suitable return. The quantity of the produce is very great, and the clear profit equally considerable: and what is of very material consequence to the good husbandman, is the excellent order in which a great crop of tares mown for hay leaves the soil. Though I was going out of this farm, yet I ordered a plough into the field to go a bout or two, to convince a gentleman then with me of the mellowness and excellent order in which the land was left by this crop: it broke up in absolute mould—an extreme fine tilth; fine enough for any seed whatever! and, at the same time, with all the marks of that putrid fermentation so strongly excited in the soil by an extreme thick crop of a leguminous plant. Wheat would have done incomparably after it; and left not the least doubt of a great crop.

## G E N E R A L O B S E R V A T I O N S.

The culture of tares for hay, carries in these experiments a very advantageous appearance: but not more advantageous than the reality; for I am strongly persuaded that the only reason of their not being more cultivated for this purpose is owing to their not being better known. What the reason is that has induced all our husbandry writers to omit this branch,—or at least to pass it over very superficially, I know not: but as to an experiment on them, no library can produce an instance. The object has deserved much more attention than it ever met with from those gentlemen: but I shall first lay before the reader the average of the preceding trials.

EXPENCES.

£. s. d.

Experiment N <sup>o</sup> 1,	—	—	—	1	15	5½
2,	—	—	—	1	14	7½
3,	—	—	—	1	16	7½
4,	—	—	—	2	2	2½
5,	—	—	—	1	15	4½
6,	—	—	—	2	13	5
7,	—	—	—	2	10	0½
8,	—	—	—	2	3	9
9,	—	—	—	2	2	6
10,	—	—	—	2	6	7
12,	—	—	—	2	15	7
13,	—	—	—	2	16	0
14,	—	—	—	2	7	7½
Total,	—	—	—	28	19	9

Average, 2*l.* 4*s.* 0*d.*

PRODUCE.

T. C. Q.

Experiment N <sup>o</sup> 1,	—	—	—	2	10	0
2,	—	—	—	1	6	2
3,	—	—	—	2	5	0
4,	—	—	—	2	16	0
5,	—	—	—	1	13	0
6,	—	—	—	2	0	0
7,	—	—	—	1	14	0
8,	—	—	—	2	0	0
9,	—	—	—	1	5	2
10,	—	—	—	1	10	0
12,	—	—	—	2	0	2
13,	—	—	—	3	8	0
14,	—	—	—	3	10	0
Total,	—	—	—	27	18	2

Average, 2 tons 3 cwt.

PROFIT.

£. s. d.

Experiment N <sup>o</sup> 1,	—	—	—	1	19	6½
2,	—	—	—	2	5	4½
3,	—	—	—	4	18	4½
Carried over	—	—	—	9	3	3½



					£.	s.	d.
Brought over,	—	—	—	—	9	3	3½
Experiment N <sup>o</sup> 4,	—	—	—	—	6	5	9½
5,	—	—	—	—	1	18	10½
6,	—	—	—	—	1	16	7
7,	—	—	—	—	1	6	5½
8,	—	—	—	—	2	6	3
9,	—	—	—	—	2	8	1
10,	—	—	—	—	0	17	2
12,	—	—	—	—	1	9	3
13,	—	—	—	—	5	7	0
14,	—	—	—	—	7	1	1½
Total,	—	—	—	—	35	19	10½

Average, 2l. 15s. 6d.

These tables at once open a view, that has not been sufficiently contemplated. We find that tares, under the variation of season and culture, met with in these trials, yield, upon an average, 2 tons 3 cwt. of dry hay; a most advantageous produce, and much superior, all things considered, to the general average of wheat, barley, and oats in this country. A clear profit of 2l. 15s. 6d. *per acre*, is not gained in one farm here in forty. But the mere amount is not the only circumstance: this profit is gained from an ameliorating crop, one which exhausts the land so little, that scarcely any prepare better for corn. This is a point of very great importance, and it certainly is undoubted. I know from various and repeated experiments, that a very thick crop of tare-hay prepares better for either wheat or barley than a fallow, though it consists of a year's tillage; and that the tare-fallow will break up for barley and clover even in finer tilth than the tillage one. The common farmers have a very just idea of this part of their business: from long experience they find, that some crops exhaust the land more than others: they find that if they gain a great crop of pease or tares, the wheat or barley that succeeds very seldom fails of being a good crop; and this observation is so strong and repeated, that very good farmers, who would scorn to sow wheat after barley, would, on no account, omit sowing it after a good crop of tares or pease.

My own particular trials give me the strongest reason to justify this practice: but if it is so beneficial to follow a good crop of these vegetables with corn, how much more advantageous it is to cut them for hay while in their full succulency, *before* the seed is formed! In this method, the benefit the land receives from them is very great; undoubtedly equal to a fallow. There is a further advantage in a crop of tare-hay when compared with a fallow, highly sufficient to turn the scale, if it did not already

already kick the beam, which is the quantity of manure arising from feeding the hay. Whatever cattle are fed with it, will undoubtedly raise a considerable portion of dung; which dung must be spread on the land, and then the barley and clover compared which grows on the tare-land so manured, with that on the fallow unmanured. This is a point always to be carried to account when crops are under consideration that are food for cattle: for if the mere product is alone considered, perhaps the greatest article is forgotten. This I am sure is the case with turneps fed on the land by sheep.

But this husbandry of raising tares for hay is, in all respects, valuable. There are many farms that have not a sufficiency of meadow ground; in which case some of their occupiers have repeated the sowing of clover till the land is quite tired of it; at least according to the opinion of many very sensible farmers. But supposing the idea to be false, yet the importance of being able to raise other hay besides clover, will often be indisputable.

There are a great many uses to which tare-hay may be applied, so as to pay the fair value of it, — which is (at the lowest) the average price of common hay: horses thrive much better on it than on any meadow or pasture hay in the world. There is none exceeds it for fattening beasts of all sorts, either to fat them with alone, or the more profitable method of giving it with turneps or other green food. In that way also sheep much affect it, and will with turneps scarcely ever be gripped by it. All sorts of young cattle thrive excellently on it. In all or any of these uses a penetrating farmer can never be at a loss to make the value of his hay by expending it at home.

I shall venture to recommend his substituting tares for hay, instead of all those crops of barley and oats, which are sown without clover: tares will not do for the sowing clover: the farmer must, therefore, sow enough barley for his annual quantity of clover; but I should, on every account, persuade him to use tares, instead of all the rest. His immediate profit will undoubtedly be greater; and the collateral articles of raising of manure, and cleaning and ameliorating his fields, infinitely exceed his former management.

The grand objection to pursuing this conduct, and which is the reason why the husbandry of cattle flourishes no more, is the farmers want of money. A poor farmer, instead of raising the cattle, which he has not money to purchase, aims expelling only such products as he can sell at market for money; and his misfortune is, that such products are most of them of the exhausting kind.

The average profit of these crops is 2*l.* 15*s.* 6*d.* now if barley, oats, or wheat, had been substituted, the reader may easily conceive what a deduction would have ensued. Every one of these crops succeeded

corn, and received but two ploughings: — wheat could not be thought of, and what could be expected of barley in such circumstances? The very profit of the tares amounts to  $3\frac{1}{2}$  quarters of barley, exclusive of all the expences; and yet it is certain the land would not have yielded  $3\frac{1}{2}$  quarters. It is the same with oats: from whence we clearly find, that tares for hay will yield very advantageous crops, when barley or oats would be losing ones.

But it will be proper further to divide the table into the crops manured for, or which succeeded a rich manuring, and others that had no such advantages.

## M A N U R E D.

## EXPENCES.

Experiment N <sup>o</sup>				£. s. d.
4,	—	—	—	2 2 2½
6,	—	—	—	2 13 5
12,	—	—	—	2 15 7
13,	—	—	—	2 16 0
14,	—	—	—	2 7 7½
Total	—	—	—	12 14 9½

Average, 2*l.* 10*s.* 11½*d.*

## PRODUCE.

Experiment N <sup>o</sup>				T. C. Q.
4,	—	—	—	2 16 0
6,	—	—	—	2 0 0
12,	—	—	—	2 0 2
13,	—	—	—	3 8 0
14,	—	—	—	3 10 0
Total,	—	—	—	13 14 2

Average, 2 ton 14½ cwt.

## PROFIT.

Experiment N <sup>o</sup>				£. s. d.
4,	—	—	—	6 5 9½
6,	—	—	—	1 16 7
12,	—	—	—	1 9 3
13,	—	—	—	5 7 0
14,	—	—	—	5 1 1½
Total,	—	—	—	19 19 9½

Average, 3*l.* 19*s.* 11*d.*

## UNMANURED.

## EXPENCES.

					£.	s.	d.
Former total,	—	—	—	—	28	19	0
Deduct manured,	—	—	—	—	12	14	9½
Unmanured,	—	—	—	—	15	4	1½
Average, 1/1. 18s. od.							

## PRODUCE.

					T.	C.	Q.
Former total,	—	—	—	—	27	18	2
Deduct manured,	—	—	—	—	13	14	2
Unmanured,	—	—	—	—	14	4	0
Average, 1 ton 15 ½ cwt.							

## PROFIT.

					£.	s.	d.
Former total,	—	—	—	—	35	19	10½
Manured,	—	—	—	—	19	19	9½
Unmanured,	—	—	—	—	16	0	1½
Average, 2/1. os. od.							

## COMPARISON.

## PRODUCE.

					T.	C.	Q.
Manured,	—	—	—	—	2	14	2
Unmanured,	—	—	—	—	1	15	2
Superiority,	—	—	—	—	0	19	0

## PROFIT.

					£.	s.	d.
Manured,	—	—	—	—	3	19	11
Unmanured,	—	—	—	—	2	0	0
Superiority,	—	—	—	—	1	19	11

I do not compare the expences, because it would not be accurate, as some crops have not the manure at first hand, and consequently the expence of it not charged; neither do I reckon the crop *that had* some ashes spread on it as a manured one—*because* they were evidently of *no* benefit.

It is clear from the comparison, that tares, like most other crops, are in proportion to the goodness of the soil; and that it answers greatly to manure

manure for them: but there are circumstances which prove this, besides the ballance of this table.

By manuring for the tares you not only ensure a very large crop of hay, but, what is of equal importance, carry the ameliorating quality of them to the highest pitch; for the larger the crop, the better that which follows. It is the thick shade breeds that putrid fermentation in the soil which is so fertilizing, and which renders the land as mellow as after the finest fallow. Farmers do not venture, and upon this principle, to sow wheat or barley after pease or tares, if the crop was thin or poor, for then the beneficial effects are comparatively trifling.

Another circumstance of very great importance, is the laying the manure on the land in such a course of management, that it may not render it foul by weeds, which is the common effect in many places. Now, by manuring for tares, this effect is totally prevented; the dung, it is true, makes the weeds vegetate, but then the rank luxuriance of the crop kills every thing else: there is nothing can exist among them but thistles, which are very easily hooked out. I have often had a crop of young tares very full of that weed; which same crops, viewed at mowing-time, have appeared as clean as any in the world—all the weeds killed and rotten—root and branch.

By laying the manure you design for wheat, on your tare fields, and sowing the wheat upon the tare stubble, you are certain of a perfectly clean crop, and also as great, if not a greater one, than if the manure had been spread directly for the wheat: and the same with barley and clover.

Upon the whole, I shall venture to recommend this crop for hay to the earnest attention of all farmers: I have the greatest reason to think that they will find it remarkably profitable; and also that they will find it very adviseable to bestow some of their manure on the crops; which will certainly pay for it as well as any other application.

## C H A P. IV.

## O F L E N T I L S.

**L**ENTILS are not commonly cultivated in any part of the kingdom with which I am acquainted; but from Mr. Lisle's *Observations on Husbandry*, I find they are in some counties common husbandry. The few trials I made on them have been with a view to the raising food for cattle; that is, mowing the lentils for hay like tares: as to any other husbandry of them, it would never have answered any purpose of mine, as the plant is so unknown in this country that the seed would not be saleable. I had mine from my London seedsman.

Lentils, from some experiments which I had made on them, appeared to be a finer food than tares: those experiments which I first made gave me no great opinion of them for quantity: they were a fine sort of food—and made excellent hay—but, I think, never equalled tares in quantity: however, as all farming points ought to be brought to the test of *registered* experience alone, I proceed to lay before the reader the trials I made on them.

E X P E R I M E N T N<sup>o</sup>. I.

Culture, expences, and produce, of ten perches, field M\*, 1765.

## C U L T U R E.

Yielded barley in 1764, the stubble of which was ploughed up in November; stirred it again in March 1765, and harrowed in half a peck of lentils. They came up favourably, and seemed throughout the season not to be much affected by the drought: mowed them the beginning of July for hay. Produce dry  $1\frac{1}{2}$  cwt. Proportions per acre.

## E X P E N C E S.

## EXPENCES.

				£.	s.	d.
Two ploughings,	—	—	—	0	2	0
Harrowing,	—	—	—	0	0	4½
Seed,	—	—	—	0	11	6
Sowing,	—	—	—	0	0	3
Mowing,	—	—	—	0	1	2
Making, &c.	—	—	—	0	2	9
				0	18	0½
Rent, &c.	—	—	—	0	17	0

## PRODUCE.

				£.	s.	d.
24 cwt. of hay at 3/.	—	—	—	3	12	0
Expences,	—	—	—	1	15	0½
Profit,	—	—	—	1	16	11½
Ploughing,	—	—	—	0	2	0
Harrowing,	—	—	—	0	0	4½
Carting,	—	—	—	0	0	10
				0	3	2½
Clear profit	—	—	—	1	13	9

## OBSERVATIONS.

This is a very profitable crop, and shews that the application of lentils to hay is very expedient to all farmers, who are desirous of raising plenty of all kinds of food for cattle. I think the quality of the hay is equal to that of the best tares, — to appearance it is much finer; but I did not perceive that cattle preferred it: but in quantity my tare experiments my lentils exceeded it. The appearance of the stubble shewed, that the thickness of the growth and shade had the same effect in cleaning and ameliorating the soil as tares.

## EXPERIMENT N° 2.

Culture, expences, and produce, of ten perches, field L\*, 1766.

## CULTURE.

This piece yielded oats in 1765; ploughed up the stubble in October, and turned it again the middle of March; after which harrowed in half a peck of lentils. Some thistles &c. were cut out in June, and the crop mowed for hay the last week in July. Produce 12 cwt. Proportion per acre.

EXPENCES.

					£.	s.	d.
Two ploughings,	—	—	—	—	0	2	0
Harrowing,	—	—	—	—	0	0	3
Water-furrowing	—	—	—	—	0	0	4
Seed,	—	—	—	—	0	12	0
Sowing,	—	—	—	—	0	0	3
Thiffling,	—	—	—	—	0	1	9
Mowing,	—	—	—	—	0	1	2
Making, &c.	—	—	—	—	0	1	8
					<hr/>		
Rent, &c.	—	—	—	—	0	19	5
					0	17	0
					<hr/>		
					1	16	5

PRODUCE.

					£.	s.	d.
21 cwt. at 45s.	—	—	—	—	2	6	3
Expences,	—	—	—	—	1	16	5
					<hr/>		
Profit,	—	—	—	—	0	9	10
Ploughing,	—	—	—	0 4 9 <sup>1</sup>			
Harrowing,	—	—	—	0 0 9			
Carting,	—	—	—	0 0 10			
					<hr/>		
					0	6	4 <sup>1</sup>
					<hr/>		
Clear profit,	—	—	—	—	0	3	5 <sup>1</sup>

OBSERVATIONS.

The profit by this trial is but trifling, which is owing to the smallness of the produce. How this crop succeeds on other soils, I am not acquainted; but on this, in a wet season, I doubt it will never answer. The quality of the hay on a par with tares.

EXPERIMENT N<sup>o</sup> 3.

Culture, expences, and produce, of twenty perches, field T, 1766.

CULTURE.

This piece formed a broad long bed adjoining to EXPERIMENT N<sup>o</sup> 8. tares. It was cultivated exactly the same: the stubble ploughed up October, and in March stirred it again, and 1 peck of lentils sown. They were once thiftled, and mown for hay with the mow. Produce 1 cwt. Proportion per acre.



EXPENCES.				£.	s.	d.
Two ploughings,	—	—	—	0	2	0
Harrowing,	—	—	—	0	0	4
Water-furrowing,	—	—	—	0	0	4
Seed,	—	—	—	0	12	0
Sowing,	—	—	—	0	0	3
Thistling,	—	—	—	0	1	6
Mowing,	—	—	—	0	1	8
Making, &c.	—	—	—	0	1	6
				<hr/>		
Rent,	—	—	—	0	19	7
				6	17	0
				<hr/>		
				1	16	7
PRODUCE.				£.	s.	d.
1 ton, 6 cwt. at 45s.	—	—	—	2	18	6
Expences,	—	—	—	1	16	7
				<hr/>		
Profit,	—	—	—	1	1	11
Ploughing,	—	—	—	0	4	9½
Harrowing,	—	—	—	0	0	10½
Carting,	—	—	—	0	0	10
				<hr/>		
				0	6	6
				<hr/>		
Clear profit,	—	—	—	0	15	5

## OBSERVATIONS.

The tares paid 2l. 6s. 3d. clear profit; but these lentils, from the inferiority of the crop, amount to but a third of that sum. It is from hence evident, that tares are on these soils to be preferred to them. I have heard of much more considerable products than mine; but apprehend they must have been cultivated on very different land.

Upon the whole, lentils do not appear to be an object of any importance for hay upon soils that will yield large crops of tares; which result of my trials, in small, kept me from extending their culture to experiments in large.

E X P E R I M E N T A L  
A G R I C U L T U R E.

B O O K III.

Of VEGETABLES, whose ROOTS are used for the  
Food of Cattle.



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## B O O K III.

### Of VEGETABLES, whose ROOTS are used for the Food of Cattle.

**I** HERE come to one of the most important parts of husbandry; the providing plenty of winter food. On this depends, in a great measure, the prosperity of the farmer. The experiments of this book include, 1. Turneps. 2. Carrots. 3. Parsnips. 4. Potatoes. 5. Jerusalem artichokes. 6. Red beets. The first is the only one commonly cultivated by the farmers of this country, consequently the trials I made of them are, on a greater extent than the others in which I had no common experience to guide me; nor can the introduction of any vegetable into the field culture be attended, at first, with a success equal to that which is the result of many years experience, and general attention. This is a circumstance which ought ever to be remembered, in reading the register of experiments on vegetables not commonly cultivated. The thing itself is not so well understood; the labouring people are untractable, and averse to any thing out of the usual road; the prices of every operation are out of proportion to those in the old methods: for these reasons ill success at setting out in new attempts should not be a cause of condemning a practice from the experience only of one or two years. I do not offer these remarks as a preface to an object which received but little attention from me: I flatter myself the reader will find that I was not remiss in my inquiries into the culture of any of these vegetables; I make them only as an explanation of the reason for my not embarking in the culture of plants not in common use, upon the same scale as I cultivated others that are on every farm.

Roots are of vast importance in agriculture. In this country turneps only are common; but in others carrots are cultivated; and in many, potatoes. By means of any that are used in a large scale, the farmer is enabled to keep large stocks of cattle in the season that raises great quantities of manure; — and it is a plenty of manure that occasions rich crops of every thing. Another great advantage attending the culture of all roots, is, the benefit the land receives; — all are fallow crops which prepare for more exhausting ones: they clean, sweeten, and ameliorate the soil; both from their nature, and the particularly attentive culture that is bestowed on them while growing. Now crops whose culture cleans the land, and that enrich it both by their culture and consumption, it is evident must be objects of very great importance to every Husbandman.

## C H A P. I.

### O F T U R N E P S.

**T**HIS root has been cultivated in Suffolk time out of mind. All our farmers are desirous of having, at least, a field of them; for none omit the culture, without finding the winter maintenance of their cattle a most unprofitable business. It is true we have many clay farms, whose soil denies their occupiers the use of this excellent root: such farmers are obliged either to mow a great breadth of land yearly for hay; or to buy turneps of their neighbours on lighter soils. The latter resource either occasions a deal of winter carting, or the manure of the cattle is lost to the farmers, by being driven to other men's grounds. If hay is the resource, the expence is very great, and consequently the farmer's profit very small: these circumstances are severely felt by our clay farmers. It is much to be regretted, that some winter vegetable is not introduced into common husbandry, that will, on clay lands, supply the place of turneps: the value of such a plant would be inestimable\*.

The culture commonly given to turneps in this country consists in four or five ploughings, and harrowings sufficient to reduce the soil to a garden fineness: most of the dung raised on the farm is used for them, or at least a considerable part of it. They are, and have been longer than the oldest man can remember, regularly hand-hoed twice; for which the common price is 4s. *per* acre for the first hoeing, and 2s. or 2s. 6d. for the second. The farmers chuse their driest soundest soils for them: the crops, in general, very good; the turneps in the best fields rising from 3 or 4lb. to 20lb. each. Upon the very dry lands, they aim as much as possible at feeding off: but when the soil is inclined to moisture or wetness, they draw them, and feed the cattle on a dry pasture, or in the farm-yard. Barley is the crop which generally succeeds; and when they are eat on the land by sheep, the product is generally large; — but when drawn, and

\* Written before the author knew that cabbages had been introduced into field husbandry.  
carried

carried off the land, yet if the turneps were manured for, the barley is good; and though no manure be laid always *clean*. This is the result of so much tillage as is bestowed on the turneps, and the complete manner in which they are hoed.

I have more than once been informed, that there are parts of the kingdom where hoeing is never practised: I can have no conception of such husbandry. Unhoed crops would not in this country sell for five shillings an acre; while hoed ones, on the same land, would yield forty. I apprehend the plant itself a novelty in such countries.

## S E C T. I.

## CULTURE and PRODUCE in the old Method.

ALL the turneps in this country are cultivated in the broad-cast method. Mr. Tull has written strongly in recommendation of the drill culture for this root; but our farmers know not that such a man has existed,

## EXPERIMENT N° I.

Culture, expences, and produce of three acres, field U, 1763.

## CULTURE.

This piece yielded wheat in 1762; the stubble of which crop was ploughed up in October. Stirred it again in April; then harrowed it, and gave another earth before the end of the month. In May ploughed it the fourth time, and harrowed it twice.

The beginning of June manured an acre and a half of it with 22 loads of farm-yard dung, (35 bushels;) the latter end of the same month ploughed and sowed, harrowing in the seed. The turneps on the manured part arose quickly, and totally escaped the fly; but the others, being of flower growth, were attacked by them, and suffered in patches, though not totally.

In August they were twice hand-hoed. For this operation I agreed with some labourers that offered themselves for the work; but being a very young farmer, I was so imposed on in the execution, that I was forced to have the manured half-hoed a third time. The latter proved a good crop; but the former was good for little; not many removes beyond mere leaves. However, that I might know accurately the product, I weighed some square perches of each in December. I had expressed a



desire to know the real produce to my bailey, (a neighbouring little farmer) and he first hinted to me the proportioning a certain part to an acre. He chose the spots that were weighed, we measured out 3 square perches in each half: one where the crops were the best; another where they were middling; and a third where they were worst. We cut the tops and the tap-roots off from both; the apples being, he informed me, the only part of value sufficient to be taken into the account, as the leaves, though they afforded some sheep feed, yet the worth is reckoned very trifling, unless in a season when crops fail, and all food is remarkably scarce. The three perches of the manured weighed 6 cwt. and the three unmanured 126 lb.

The first is at the rate of	—	—	16 tons <i>per</i> acre.
The last	—	—	3
Superiority of the manured	—	—	<u>13</u>

A comparison that convinced me sufficiently of the necessity of manuring these soils for turneps. I shall draw up the account for each separate: but in charging the value of the crops, I am totally at a loss. I used them for assisting with straw to winter some dry cows, young cattle, and sheep and lambs; but know not how to charge the amount with that accuracy, which ought always to be desired in every thing that concerns the product of crops. I made pretty exact minutes of the feeding the cattle: but then the horned kind had straw besides, and the sheep had several fields to run over. To estimate the crop at the price at which they would have sold, would be the most fallacious of any method; because that price must always depend on accidents, and sometimes would be no price at all. Turneps are too bulky to carry far; your neighbours may all have a sufficiency. In such a case you can sell none: besides, the quantity bought in this country is so small, that it never forms a standard price, as in all sorts of corn and meat. Hence it appeared to me, that the only method of ascertaining the produce, would be by valuing the utility they are found of in wintering your cattle. This cannot be done with minute accuracy; but it will come much nearer the truth than any other valuation. I questioned my bailey concerning the quantities of turneps, by weight or measure, that would maintain various sorts of cattle a given time, which appeared to me the only clear method of ascertaining the truth: but he could give me no information of that sort; nor any farmer I conversed with, though I applied to several. Myself and bailey, however, fixed the fair value the turneps were of to me; and I believe the valuation was extremely near the truth.

## ACCOUNT of the MANURED.

EXPENCES.					£.	s.	d.
Five ploughings,	—	—	—	—	0	7	6
Four harrowings,	—	—	—	—	0	0	9
Water-furrowing,	—	—	—	—	0	0	9
Seed,	—	—	—	—	0	0	6
Sowing,	—	—	—	—	0	0	4½
Manuring,	—	—	—	—	0	8	0
Thrice hoeing, 4s. 2s. and 2s.	—	—	—	—	0	12	0
					<hr/>		
Rent, &c.	—	—	—	—	1	9	10½
					1	5	6
					<hr/>		
					2	15	4½

PRODUCE.					£.	s.	d.
Value of the assistance received in keeping the cattle and sheep,	—	—	—	—	3	0	0
Expences,	—	—	—	—	2	15	4½
					<hr/>		
Loss,	—	—	—	—	0	4	7½
Ploughing,	—	—	—	0 11 3			
Harrowing,	—	—	—	0 1 6			
Manuring,	—	—	—	0 9 2			
					<hr/>		
					1	1	11
Total loss, at ol. 17s. 8½d. per acre,	—	—	—	—	1	6	6½

## ACCOUNT of the UNMANURED.

EXPENCES.					£.	s.	d.
Five ploughings,	—	—	—	—	0	7	6
Four harrowings,	—	—	—	—	0	0	9
Water-furrowing,	—	—	—	—	0	0	9
Seed,	—	—	—	—	0	0	6
Sowing,	—	—	—	—	0	0	4½
Twice hoeing,	—	—	—	—	0	9	0
					<hr/>		
					0	18	10½
Rent, &c.	—	—	—	—	1	5	6
					<hr/>		
Carried over,	—	—	—	—	2	4	4½

					£.	s.	d.
Brought over,	—	—	—	—	2	4	4½
P R O D U C E.							
Valuation as above in feeding stock,	—	—	—	—	0	7	6
Loss,	—	—	—	—	1	16	10½
Ploughing,	—	—	—	0 11 3			
Harrowing,	—	—	—	0 1 6			
				—	0	12	9
Total loss, 1 <i>l.</i> 13 <i>s.</i> 1 <i>d.</i> per acre,	—	—	—	—	2	9	7½
Loss by the unmanured per acre,	—	—	—	—	1	13	1
Ditto by the manured,	—	—	—	—	0	17	8½
Superiority of the latter,	—	—	—	—	0	15	4½

## O B S E R V A T I O N S.

This has been by no means good husbandry: turneps ought on no account to have been sown on this land at all. It is very heavy and wet, strong enough for beans; so that no conclusions can be drawn relative to the turnep culture in general, from particular trials in bad husbandry. The manuring is evidently of high consequence, — without it, the crop is next to nothing: the difference of 1*l.* 13*s.* and 17*s.* loss is very great; and proves, that if people will cultivate this root on an improper soil, they ought to make it a point to manure well. Relative to the amount of the crop, the calculation is moderate; but the crop was in the best part a very indifferent one; and the expences of the culture run so high, that an indifferent or a middling crop will be a losing one; nor should it be forgotten, that one considerable part of the profit of turneps is the benefit which the land ought to receive from them, and the general advantage of raising manure: so that an idea of their utility should never be formed from the product alone. This is not a notion peculiar to me, or arising only from this experiment; it is the general opinion of all the farmers in the neighbourhood, who commonly estimate the *collateral* advantages of a turnep crop on found land equal to the *immediate* ones. The value per ton of the manured 2*s.* 6*d.*

## E X P E R I M E N T N° 2.

Culture, expences, and produce, of two acres and a half, field R, 1764.

## C U L T U R E.

Yielded spring corn in 1763; the stubble of which was ploughed up in October. Stirred it again in March; and also in April, and harrowed it

it twice. Gave it another earth the middle of May, and harrowed it once. The 23d of June ploughed and sowed, and harrowed twice. The first week in August hand-hoed them, and again the first week in September.

The uncertainty of valuing turneps I had before experienced, and that induced me to be very attentive to the expenditure of my crops this year. I weighed perches of this piece several times to discover the weight, and registered the cattle maintained exactly, that I might discover the value *per ton*.

The beginning of December weighed three perches chosen indifferently : one where the crop was the best ; one where it was the worst ; and the other where it was but middling. The amount of the three was 12 cwt. the apples only weighed. This proportion is 32 tons *per acre*. The end of January I repeated the experiment : the weight of three, chosen in the same manner, then amounted to 12 cwt. 3 quarters, or 34 tons *per acre*. I again repeated the trial the latter end of March : the weight then was 11  $\frac{1}{4}$  cwt. or *per acre* 30 tons. Weighing in manner could not but give the real product *per acre* ; which plainly appears to be 32 tons upon an average of season. The crop seems to have improved from December to January ; but to have declined from January to March.

The last week in November I bought in fix Scotch black steers, and stalled them in my farm-yard on these turneps. The crop lasted them till the middle of April, when they were sold off to two butchers. They cost 3*l.* and were sold for 38*l.* 15*s.* 0*d.* Improvement 7*l.* 15*s.* 0*d.* which is 3*l.* 2*s.* 0*d.* *per acre* ; and, at 32 tons, is 1*s.* 11*d.* *per ton*.

But upon this I have two circumstances to remark ; first, the beasts had not fair play : for I was so *experiment* mad, that although my bailey told me they undoubtedly ought to have hay, however small the quantity ; yet I was so eager to know the value of the turneps separately, that I determined (very mistakenly) that they should have nothing else to eat. Secondly, I reckon nothing for litter, or attendance ; because that account, were it united with the present, would add much to the balance of profit, the dung being of much superior value ; the particulars of which, as well as the quantity they eat *per diem*, &c. &c. will be inserted under the article *Cattle*.

Notwithstanding these objections, I came nearer the mark in these trials, at which I had long aimed, than any of my husbandry books (and my collection is not a small one) had enabled me. I had in vain turned them all over to discover the value *per ton* of an acre of turneps applied in any given manner : and whoever has made it his business to form experiments, I doubt has found himself in the same case, anxious to gain an answer to a single query ; but seeking in books in vain, — and forced to apply experiment, though a year in the execution, to answer what his books refuse. The valuation gained by these trials I am sensible

cannot

cannot be complete and permanent; because it is founded only on one application of the crop; other uses may be more or less profitable: but each experiment should be rated at its real product whatever the use: barley, wheat, beans, every thing varies; so must turneps; one trial cannot take in all prices, but several may include the whole. In whatever manner the crop is expended, the profit arising should be minuted; and then, after some years of experience, an average will in all probability give the real truth. It shall be my endeavour to gain that truth, if I am happy enough to possess the opportunity.

EXPENCES.					£.	s.	d.
Five ploughings,	—	—	—	—	0	12	6
Five harrowings,	—	—	—	—	0	1	8
Seed,	—	—	—	—	0	1	3
Sowing,	—	—	—	—	0	0	7½
Twice hoeing, at 4s. and 2s. 6d.	—	—	—	—	0	16	3
Drawing and carting home, at 7s. 6d.	—	—	—	—	0	18	9
					<hr/>		
Rent, &c.	—	—	—	—	2	11	0½
					2	2	6
					<hr/>		
					4	13	6½
PRODUCE.					£.	s.	d.
Improvement of the beasts by stall-feeding,	—	—	—	—	7	15	0
Expences,	—	—	—	—	4	13	6½
					<hr/>		
Profit,	—	—	—	—	3	1	5½
Ploughing,	—	—	—	0 12 6			
Harrowing,	—	—	—	0 2 4			
Carting home,	—	—	—	1 8 1½			
					<hr/>		
					2	2	11½
					<hr/>		
Clear profit, <i>ol.</i> 7s. 4½d. <i>per</i> acre,	—	—	—	—	0	18	6

## OBSERVATIONS.

I must first remark, that the carting the turneps home, which is here an heavy expence, and of which no minute has before occurred, is charged at the price it cost me when I set my team to work at it. Three boys draw and load, and a man drives away: an acre contains tops, tails, and all, about 60 cart loads. I have charged the horses, and wear and tear, at the price of dung, as the turneps are as heavy. I have great reason to believe, that a boy, with one horse and a small cart, would get them home as fast as wanted cheaper; but I cannot make a variation in the charge till I have

have ascertained the fact. The cheapest way of going to work, would undoubtedly be to keep a boy at work in bringing home the turneps, feeding, and cleaning out: but then the number of beasts must be sufficient to keep him constantly at work. These points may, perhaps, be further elucidated afterwards. They admit not of so regular a charge as other expences.

From the best observations I could make, I had preconceived that this crop would be unprofitable: the expences, by the time the turneps are got home, run so high, that I did not look to the direct produce of the crop for the advantage. I think upon the whole we ought not to expect it: the culture is a substitute to a fallow, which yields nothing. If they clean the land, and raise a large quantity of manure, I apprehend they answer all the ends that can reasonably be expected from them, supposing their product only to pay the expences. That this state of the case shews them to be a most profitable crop, cannot for a moment be doubted. For the expence of a year's complete fallow to land for barley is very great, and the crops not exceeding the turnep-land ones: for the turnep preparation is very complete; and if the dung so raised be spread on the land, it will beyond all doubt raise much greater crops of barley than any common fallow: and this holds, perhaps, stronger with those that are fed off with sheep. Such a preparation is in this country reckoned the best of all for barley; and, when the turneps are very forward, even for wheat.

The fatting these six steers raised me 65 good loads of dung, which, with allowance for rotting, would amply manure the two acres and an half of land. — Thus every acre of turneps raises manure sufficient for itself; so that the turnep culture cannot be introduced in a farm without making great improvements: for to raise a crop that will manure its own number of acres, is a culture sufficient presently to bring a whole farm into heart.

The difference between a fallow in this manner paying expences and raising manure enough for itself, and another which yields no return, nor any dung, is immense: — sufficiently great for the farmer not to make direct profit an object. — Without yielding a shilling immediate profit, it may be called the most profitable crop in the world. — But there is one circumstance relative to this culture, which should not be omitted; for it explains the conduct of many farmers, who possess very favourable soils, and yet raise but a trifling quantity of turneps, compared to what they might do; double cropping their land with corn some times, and at others summer-fallowing the very fields which would yield turneps in abundance. This management to appearance is preposterous; I have frequently remarked it, and heard it observed by others, without any satisfactory reason for it. The present trial is a sufficient explanation. The purchase of the lean stock for the stall-feeding comes alone to 12*l.* 8*s.* 6*d.*

per

P R O D U C E.					£.	s.	d.
Value of the sheep-feed,	—	—	—	—	2	12	6
Expences,	—	—	—	—	1	13	10½
Profit,	—	—	—	—	0	18	7½
Ploughing,	—	—	—	0 5 0			
Harrowing,	—	—	—	0 0 11½			
Carting,	—	—	—	0 6 6			
					0	12	5½
Clear profit,	—	—	—	—	0	6	2½

## O B S E R V A T I O N S.

I before remarked, that the direct profit on turneps was by no means the principal object. Six shillings an acre, clear profit, are, with a crop that requires so much attention and expence, not a matter of importance: — it is the collateral advantages which render this culture of so much consequence. The immediate profit of 6s. is certainly the least article of three: saving the expence of a fallow, which, rent and charges included, would have amounted to about 27s. is a vastly superior profit: it makes the 6s. at once 33s. And the raising manure by wintering so many more cattle than could be kept without them, equals the amount of many six shillings.

I could this year have bought such an acre as this for from 25s. to 30s. an acre; but then I must have driven my sheep to another man's farm, and kept them constantly in, the turneps till eat off, and that by a certain time; all which would by no means do for any thing but fattening sheep. I think 2l. 12s 6d. a much cheaper rate, under the circumstances of this experiment, than 25s. would be on such conditions. If I bought to cart home, the distance of the drive would make them nearly 5l. an acre. Whenever it is said, that turneps are worth so and so, because such are the selling prices, the attendant circumstances should always be considered: they will probably double that price in some instances, and heighten it greatly in most. In buying you can very seldom use the turneps as you please: to put a flock of stock-sheep into a field of turneps is feeding to unnecessary waste, unless you make them follow a flock of fattening ones: and no farmer, without being paid for it, will allow them to go into a grass field, especially if it is in the spring. Moving of hurdles backwards and forwards from home is expensive work: and whatever care you take, wet weather may come, in which you would only bait your sheep if at home, but cannot when the turneps are bought. These, and many other reasons, unite to render the selling price of turneps a very bad rule to judge of their real value.

The inferiority of this crop in weight to N<sup>o</sup> 2. shews plainly how necessary it is to sow early. I have heard the farmers speak of late sowing a part of their crop in expectation of its lasting the longer in the spring; but this experiment shews the idea to be a mistake. The part early sowed in this field yielded near double the weight of this acre, and lasted as well to the full. The difference of half, in the variation of little more than a fortnight, is very great, and proves the necessity of getting our turnep crops into the ground as early in June as possible.

EXPERIMENT N<sup>o</sup> 4.

Culture, expences, and produce, of a rood, field M\*, 1764.

## CULTURE.

Yielded wheat in 1763; the stubble of which was ploughed up in October, and 5 loads of farm-yard dung turned in. In February ploughed it again: in March gave the third earth, and harrowed it; and before the end of the month ploughed it across. In April stirred it three times, and harrowed it thrice. In May one ploughing more, and one harrowing: and the first week in June manured it again with three loads of compost, consisting of equal parts of rotten farm-yard dung, — coal ashes, — and rotten hog dung; ploughed it in, and harrowed in the seed. The turneps came up with great vigour, and, after their first appearance, so soon got into the rough leaf, that had it been an unfavourable season, (which was not the case) I do not think the fly would have had time to destroy them. This is an object of much importance: for if we save our crops from that insect by the same means as we add to their value, and enrich our land, it seems much the most feasible method of security.

They flourished away, at a fine rate, throughout the season, and carried a very beautiful appearance. They were hand-hoed at the usual time; that is, as soon as they would stand the hoe. They came on so fast, that I ordered the men in again, within a day or two after their finishing, to give them the second hoeing. They grew so vigorously, that I thought it afterwards advisable to hoe them a third time, that any accidental plants, which in the former hoeings were left too near each other, might be cut up. This was accordingly performed.

I was very attentive to the weighing this crop, that I might discover the return made for such good husbandry. The beginning of December I marked three square perches, in three various parts of the rood, (which was, in general, a very equal crop :) they weighed 15  $\frac{1}{2}$  cwt. which makes the very considerable produce of 42 tons *per* acre; tops and tails cut off. There were 147 turneps, consequently they weighed 12lb. each, on an



average; some of them reached  $16\frac{1}{2}$  lb. About two months after this, viz. the end of January, I weighed three other perches: they then amounted to  $16\frac{1}{2}$  cwt. or *per acre* 44 tons. The number of turneps 141; the average weight *per root* 13 lb. I repeated the trial the middle of March, when three other perches weighed  $14\frac{1}{2}$  cwt. which is *per acre* 38 tons. There were 145 turneps, at 11 lb. each.

First weighing,	—	—	—	42 tons.
Second ditto,	—	—	—	44
Third ditto,	—	—	—	38
				<hr/>
Average, 41 tons.				
Upon the rood, $10\frac{1}{2}$ .				

I stall-fatted two dry cows on the produce of this rood, and it lasted them nine weeks. They had hay given in their rack, which was weighed to them; and they eat in the nine weeks  $5\frac{1}{2}$  cwt. The two cows cost lean 7*l.* 15*s.* 0*d.* and they were sold from the turneps for 9*l.* 6*s.* 0*d.* The account must be stated as follows:

Profit on the fattening,	—	1	11	0
$5\frac{1}{2}$ cwt. of hay, at 1 <i>s.</i> 6 <i>d.</i>		0	8	3
The turneps,	—	<hr/>		
		1	2	9
<hr/>				

This is 2*s.* 3*d.* a ton.

EXPENCES.					£.	s.	d.
Nine ploughings,	—	—	—	—	0	2	3
Seven harrowings,	—	—	—	—	0	0	2
Manuring the first,	—	—	—	—	0	2	6
Seed,	—	—	—	—	0	0	1 $\frac{1}{2}$
Sowing,	—	—	—	—	0	0	0 $\frac{1}{2}$
Manuring the second,	—	—	—	—	0	6	0
Hoeing thrice, at 4 <i>s.</i> 2 <i>s.</i> 6 <i>d.</i> and 2 <i>s.</i>	—	—	—	—	0	2	1 $\frac{1}{2}$
Drawing and carting home,	—	—	—	—	0	2	6
					<hr/>		
Rent, &c.	—	—	—	—	0	15	8 $\frac{1}{2}$
					0	4	3
					<hr/>		
					0	19	11 $\frac{1}{2}$
					<hr/>		

PRODUCE.

P R O D U C E.						£.	s.	d.
10 $\frac{1}{2}$ tons,	—	—	—	—	—	1	2	9
Expences,	—	—	—	—	—	0	19	11 $\frac{1}{2}$
Profit,	—	—	—	—	—	0	2	9 $\frac{1}{2}$
Ploughing,	—	—	—	0	2	3		
Harrowing,	—	—	—	0	9	4		
Manuring twice,	—	—	—	0	6	3		
Carting,	—	—	—	0	3	9		
						0	12	7
The above profit,	—	—	—	—	—	0	2	9 $\frac{1}{2}$
Costs, <i>1<i>l.</i> 19<i>s.</i> 3<i>d.</i> per acre,</i>	—	—	—	—	—	0	9	9 $\frac{1}{2}$

## O B S E R V A T I O N S.

This experiment is in several instances remarkable. We find from it, first, that ample manuring and proportionate tillage will force a vast crop of turneps: for such I must be allowed to think, 41 tons *per* acre, weighed without the tops or tap-roots: it is a quantity which I did not apprehend could have been raised on an acre; but the general size of the roots was so considerable, that the weight much exceeded my expectations. The labourers, who hoed them, insisted, that I cut up too many plants: — they said I should damage my crop greatly. But the same men in the winter, when they viewed the piece, said it was as fine, if not the finest, they had ever seen: but some farmers who saw it, insisted that they had had as good crops throughout a whole field; and one assured me, that he had in Essex seen many finer crops. I think it not at all improbable, that soils, which possess a great *natural* fertility, may much exceed any artificial excellence. I am pretty confident, that I have viewed soils, which, in a long course of rich manuring, have acquired gradually a degree of richness, which no human power could give in the space of a twelvemonth. — But the workmen agreed, that the turneps were set out at proper distances; — and that I was perfectly right in my orders to leave the plants of this crop something thinner than common.

A rood of land fattening two cows — (they weighed about 35 stone, at 14lb.) is at the rate of 8 to an acre: but I should remark, that they were not completely fat when I sold them; but I would not give them any other food, that I might be able to know accurately the degree of benefit they received from this rood; nor do I think it altogether a just idea (at least in this country) which some men have of making it a point to *complete* the fattening of every beast they begin, though they are forced to buy food for them under disadvantageous circumstances. A beast

half, or three-fourths fat, will here sell for its value, and so will the variations of being in good heart, and plump, compared with leanness and poverty. But I admit that it is adviseable in stocking a given quantity of land to proportion the cattle, so as to fat them completely:— and in business in large it is as easy as the other conduct.

Now one acre of turneps nearly fattening eight beasts, with the help of but a small quantity of hay, appears to me to be a very great produce. These two cows yielded 15 loads of dung, which are in the proportion of 60 loads *per* acre. These 60 I apprehend would waste to 40 in good order for turnep land; half of which would be sufficient for an acre. Thus one acre of such turneps as this crop, amply manures two the following year, which is a progression of improvement of the utmost importance, and alone sufficient to bring a poor farm into great heart.

This rood is stocked at the rate of 31*l.* 15*s.* 0*d.* *per* acre. Here is the great expence of turneps; twenty acres require 635*l.* in stock! This is a train that evidently requires a vast capital in business, to a quantity of land comparatively small. A capital that not one farmer in five hundred possesses.— Suppose, by feeding the beasts a much longer time, two thirds of this amount are taken: it is then above 20*l.* an acre for stock. The raising a sufficiency of manure, for getting a farm into great heart, requires such a sum, if the turneps are as good as those of the experiment in question. Suppose the crops not so great,— only two thirds, and that the cattle to be purchased are proportioned, they will then require 14*l.* an acre. Suppose a farm 400 acres of arable, and the soil turnep land; he ought on every account to have 100 acres of turneps every year: his standing stock will probably require 10 or 12 acres, (if not a sheep-walk farm): but say 20; he has then 80 for stall-feeding; that is, a quantity which requires 1120*l.* to buy the cattle for. A sum, in all probability, equal to the whole stock of his farm! Such are the circumstances which keep the generality of farmers from making the most of their land by the culture of this excellent root.

The loss of near forty shillings an acre by this crop, is to be attributed to the height of the expences. Turneps are not a crop that will in any consumption pay great expences. I have ~~before~~ remarked, that the cultivator should not expect such advantages: and although the loss on this crop is not trifling, yet the profit on it, by the end of the course, will, I am very clear, be considerable: the fine tillage—the double manuring—the treble hoeing—with the thickness of the shade of so great a crop, which breeds quite a putrid fermentation on the surface of the soil—altogether ensure large crops of barley, of clover, and of wheat, in succession; after which it should be cropped with turneps again in course. These circumstances will certainly prove so efficacious, that further manurings will be unnecessary: I therefore make no mention of the 60 loads

loads of dung *per* acre, made by the fatting, which alone much more than ballance the loss of forty shillings.

### OBSERVATIONS on the CROPS of 1763 and 1764.

My experiments in these years have, by no means, been of that extent I could wish; but an attentive observation of the principal points concerning them, with very accurate registers of all, have made some amends for the want of other advantages. One point, the great want of which sufficiently ascertained, had perplexed me extremely, *viz.* the discovering the average value *per* ton of the crops, I have made some progress in, and hope in future years to bring it to an absolute certainty. It appears that the value *per* ton of these crops is as follows:

			£.	s.	d.
Experiment N <sup>o</sup> 1, feeding lean cattle and sheep,	—	—	0	2	6
Experiment N <sup>o</sup> 2, fatting black cattle,	—	—	0	1	11
Experiment N <sup>o</sup> 3, feeding stock-sheep,	—	—	0	3	1
Experiment N <sup>o</sup> 4, fatting cows,	—	—	0	2	3
			<hr/>		
			0	9	9
			<hr/>		

Average, *ol.* 2s. 5½d.

The result of this little table is the intelligence which I much wanted myself, and turned over many books in vain for. The average price is a standard by which to value future crops, when the expenditure does not ascertain it. But I shall continue to compare the one with the other; and gain, by degrees, a more accurate average, by drawing it from a greater variety of crops, — and from other modes of expending them. I esteem this object very important: for if the value of a given weight of any food be not known as accurately, as hay for instance, husbandry writings cannot possess that minute exactness, which is requisite for giving a judicious practical reader satisfaction.

The further experience of these years proves turneps to be a very important object to all farmers, and particularly as it appears that they may be raised to great perfection without manure, — even to 32 tons *per* acre. Manure, as it may be imagined, will carry the crops to a great height, and in general secure them from the fly; but the idea that they cannot be raised without a great plenty of dung, is palpably a mistake. But at the same time that we make this observation, it must be allowed that manure is absolutely requisite to carry the crop to a capital produce, and to make the culture as profitable as it admits. — This is so strongly the case, that I should recommend good manuring for the crop to all who cultivate it. — These circumstances are very well connected; for a farmer, when he at first enters into the turnep culture, or when he begins to extend his crops

crops beyond the quantity necessary for his regular stock, may, in all probability, be without a sufficiency of manure for his turnep fields. In such case he must sow them without such advantage; but then the consumption of the crop is sure to raise him such an increase of quantity, that the succeeding year he will be much nearer the manuring all his fields, and consequently continue in a regular progression of quantity, until his turneps, from the increasing richness of his soil, will come to perfection, and every acre yield manure enough for several.

But here I should remark, that unless his crops are fed on the land (which I think is by no means advisable, except with sheep) he will lose much of these beneficial effects, if he possesses not a sufficiency of straw or stubble to keep his beasts well littered down. They cannot be kept too clean, and it is incredible the quantity of straw they will by that means make into dung. Turneps are a food that passes very much by urine, — the quantity of which is great: their litter will want changing, in part, twice a day; and whoever will observe to give them enough of it, will find the heap of dung against his fattening shed surprising. I took great pains in this article, — viewing my beasts often every day, and never without giving strict orders for clean litter. It is no easy matter to make servants enter sufficiently into your ideas upon this point; and as the doing it much increases their trouble, you will never be too well obeyed.

#### EXPERIMENT N<sup>o</sup> 5.

Culture, expences, and produce, of four acres, field P, 1765.

#### CULTURE.

The wheat and oat stubbles were turned up soon after harvest. The 13th of April it was stirred for the first time in Spring. Between the 20th and 24th of May it was ploughed again: the 28th it was rolled and harrowed. The 5th of June, &c. it was half ploughed across. The 17th harrowed it. Rain fell the 14th, &c. which gave me an opportunity, by harrowing, to pulverize it more than by ploughing; but many clods yet remaining unbroke, I rolled it the 19th with a large pasture roller, and two horses. The 20th harrowed it again. The 22d, &c. ploughed it again. The 24th, &c. rolled and harrowed it. July the 10th, the seed earth, sowed the turneps, and rolled them in. The extreme drought prevented the seed from vegetating: therefore, between August the 3d and 13th, it was again ploughed, sowed, and harrowed. The plants arose but slowly 'till the 18th, when an extreme fine rain came, which brought them up very thick. They were began to be hoed the 17th, and the whole field finished the 15th of October. The next day began them for a second time: but the work went on very slowly, and was but indifferently performed, owing to the heavy rains which then fell; insomuch that neither  
the

the cut turneps, nor the weeds could die, and the land began to poach in some places. To remedy these inconveniencies, I began the 26th to thin them by hand, carrying them in baskets to the borders of the field, and then a cart took them to the hog-copper for boiling. The middle of November came some sharp frosts, which stopped their appling; the only product was some sheep feed, of which I kept a regular account. The four acres maintained 40 sheep five weeks, eat on the land. Weight 5 tons *per acre*.

## EXPENCES.

	£.	s.	d.
Seven ploughings,	—	1	8 0
Eight harrowings,	—	0	4 0
Seed,	—	0	4 0
Sowing,	—	0	1 0
Three rollings,	—	0	2 0
First hoeing,	—	0	16 0
Second ditto,	—	0	8 0
Thinning by hand,	—	0	10 0
Water-furrows,	—	0	1 0
		<hr/>	
		3	14 0
Rent, &c.	—	3	8 0
		<hr/>	
		7	2 0

## PRODUCE.

	£.	s.	d.
Value of the turneps boiled for the hogs,	—	0	7 6
Keeping 40 sheep five weeks, at 3d.	—	2	10 0
		<hr/>	
		2	17 6
		<hr/>	
Expences,	—	7	2 0
Produce,	—	2	17 6
		<hr/>	
Loss	—	4	4 6
Ploughing,	—	3	7 1
Harrowing,	—	0	12 0
Rolling,	—	0	0 6
		<hr/>	
		3	19 7
		<hr/>	
Total loss, 2l. 1s. 0½d. <i>per acre</i> ,	—	8	4 1

## OBSERVATIONS.

This is a heavy loss; but it was by no means peculiar to this field or this farm: the neighbourhood in general experienced the same, or rather

a worse fate; for they gained no product at all. The seed of most of the crops did not vegetate; and those which did, were eaten by the fly; so that the land, which was designed for turneps, was in general sown with wheat. Middling crops sold for five pounds *per acre*; a price never before heard of in this country. — I should remark, that although there is an apparent loss of 8% on this account, yet the value of the fallow for corn should be considered: the tillage given for turneps is given also for the crop which follows. — But this being the case with all fallow crops, we cannot vary the mode of drawing up the accounts without falling into confusion.

EXPERIMENT N<sup>o</sup> 6.

Culture, expences, and produce, of five acres, field P, 1765.

## CULTURE.

The culture of this piece was the same as that of the preceding, to the first hand-hoeing; but after that I attempted no other operation; neither a second hoeing, nor thinning; but left the crop to be fed off by sheep in the spring. Their apples were very trivial, the leaves being of as much consequence. In March and the beginning of April they maintained 60 sheep in the field three weeks. Three tons *per acre*.

## EXPENCES.

				£.	s.	d.
Seven ploughings,	—	—	—	1	15	0
Eight harrowings,	—	—	—	6	5	0
Seed,	—	—	—	2	5	0
Sowing,	—	—	—	0	1	3
Three rollings,	—	—	—	0	2	6
Hoeing,	—	—	—	1	0	0
				<hr/>		
Rent, &c.	—	—	—	3	8	9
				4	5	0
				<hr/>		
				7	13	9

## PRODUCE.

				£.	s.	d.
Keeping 60 sheep three weeks, at 3d.	—	—	—	2	5	0
Expences,	—	—	—	7	13	9
Produce,	—	—	—	2	5	0
				<hr/>		
Loss, Carried over,	—	—	—	5	8	9



						£.	s.	d.
Loss, brought over,	—	—	—	—	—	5	8	9
Ploughing,	—	—	—	—	4 3 10			
Harrowing,	—	—	—	—	0 15 0			
Rolling,	—	—	—	—	0 0 7½			
Total loss, 2l. 1s. 7½d. per acre,	—	—	—	—	—	4	19	5½
						10	8	2½

## OBSERVATIONS.

This crop, like the preceding, was so affected by the season, and the late sowing, that the loss on it is great. Upon this piece a good deal of the seed, first sown, came up; but the plants were very soon quite eaten up. At one place, for an experiment, I scattered foot, but it did not save them: the growth was so slow, that the flies had a sufficiency of time totally to destroy them. I much doubt the existence of any remedy for this great evil, except that preventive one of making the land so rich that the young plants grow a race with the insects; in which case they will very often, generally indeed, get into the rough leaf before their enemy has perfected his work. But still, as the possession of green winter food is an object of the highest importance to every farmer, it is much to be regretted that their whole dependance is on a plant, which is subject to such total failures. Surely some other crop might be discovered, to serve as a succedaneum to turneps. — Quere, If some sort of cabbages might not be applied to this use? They are crops which scarcely ever fail in gardens, though twice or thrice transplanted. In case they were tried, I apprehend the seed should be sown in spring; and as soon as the turnep crop was known to be past hope, to give one more ploughing to the land, and set out the cabbage plants directly. I have tried some, but not such sorts as will do instead of turneps.

## EXPERIMENT N° 7.

Culture, expences, and produce, of a rood, field M\*, 1765.

## CULTURE.

Yielded wheat in 1764; the stubble of which was ploughed up in October, and five loads of rotten farm-yard dung at the same time turned in. The middle of April gave it the first spring ploughing. In May



stirred it twice more, and harrowed it thrice. Manured it again on this harrowing with three loads more of dung, and ploughed it in with the seed, which my bailey advised, as the weather was a drought, and threatened the turneps much if rain did not come: this was the third week in June. They came up notwithstanding the drought, but were attacked by the fly; it was not clear whether I should not lose the crop: they escaped being quite destroyed, though every plant much eaten; but getting into the rough leaf were safe. They came on and flourished (considering the extreme dryness of the season) in a surprising manner; and when the rain came, which was not till August, they profited so much by it, that I was sure of a great crop. They were hand-hoed twice.

The latter end of December I weighed three square perches at such places as to give the fair average of the field: they weighed 15 cwt. 3 qrs. which is *per* acre 42 tons. A very great produce, and especially in a season that destroyed nine tenths of all in the country: one turnep weighed 21 lb. In February I weighed three more perches, which amounted to 17 cwt. 1 qr. which is in the proportion of 46 tons *per* acre. I gave them to my sheep and lambs, and a few to some young cattle. The value of the assistance they were of in wintering them my bailey determined, from my minutes, to be 1*l.* 3*s.* 0*d.* which was the average of three calculations. As the rood yielded 11  $\frac{1}{2}$  tons, it is 2*s.* a ton, and 4*l.* 12*s.* 0*d.* *per* acre.

EXPENCES.					£.	s.	d.
Five ploughings,	—	—	—	—	0	1	3
Five harrowings,	—	—	—	—	0	0	2
Manuring twice,	—	—	—	—	0	3	9
Seed,	—	—	—	—	0	0	3
Sowing,	—	—	—	—	0	0	0 $\frac{1}{2}$
Hand-hoeing,	—	—	—	—	0	1	6
Drawing and carting,	—	—	—	—	0	2	8
					0	9	7 $\frac{1}{2}$
Rent, &c.	—	—	—	—	0	4	3
					0	13	10 $\frac{1}{2}$

PRODUCE.					£.	s.	d.
Value of the crop for feeding sheep,	—	—	—	—	1	3	0
Expences,	—	—	—	—		13	10 $\frac{1}{2}$
Profit,	—	—	—	—	0	9	1 $\frac{1}{2}$

				£.	s.	d.			
Ploughing,	—	—	—	0	2	11½			
Harrowing,	—	—	—	0	0	5½			
Manuring,	—	—	—	0	3	0			
Carting home,	—	—	—	0	4	0			
				<hr/>			0	10	5½
The above profit,	—	—	—				0	9	11½
Loss, <i>ol. 5s. 4d. per acre.</i>							<hr/>		
							6	1	4
							<hr/>		

## O B S E R V A T I O N S.

The ballance of such an account, on a fallow crop, I have often remarked is not to be the only rule in judging of its value. Here is a loss of *5s. 4d. per acre*; but then the great advantage of the soil being in such excellent order to receive barley, with clover for wheat, appears not in such account; — nor the vastly important object of raising large quantities of dung, which diffuses its benefits throughout your whole farm; evidently in some instances, unseen in others. Hence we must not estimate the value of this crop by the mere ballance of the account.

The product of so large a crop as 46 tons on an acre, in so unfavourable a season, is an object of prodigious consequence, and is solely to be attributed to the manuring. I had several pieces sown upon excellent tillage, without manure, but all failed: the rich manuring this piece received forced on the crop, so as to escape the fly, which was making the difference of a great product in one case, and none at all in the other.

The largeness of it proves, that if the turneps, on good land rise, and escape the fly, they will prove a great crop, whatever the season.

E X P E R I M E N T N<sup>o</sup> 8.

Culture, expences, and produce, of two acres, field O, 1766.

## C U L T U R E.

Yielded wheat in 1765; ploughed up the stubble the latter end of September; the middle of May ploughed it again, and also harrowed it twice. June 3d ploughed it again, and harrowed it the 13th; after this rolled it with the great roller and two horses. The 24th, &c. manured it with hog-dung directly from the hog-yard, 40 loads on the two acres. The first week in July ploughed it in, and harrowed in the seed. The first week in August hand-hoed the plants the first time; they promised, from the uncommon luxuriance of the appearance, to be a prodigious fine crop: the 20th gave them the second hoeing: they flourished away at a great rate till the 11th of September, so that the growth prevented my giving a third hoeing;

hoing; but a very dry time set in then, which seemed to check them; it lasted till the 23d of October. The end of that month I began to draw them for use, in fattening some large oxen; and that I might know exactly the produce *per* acre, I measured three perches fairly, to include the best, middling, and worst part of the field, and they yielded 6 cwt. or *per* acre 16 tons; the smallness of which produce much surprized me, and particularly as the size of many of the turneps was very large; several of them measured 2 feet 2 inches in circumference, and yet weighed, topped and tailed, only 5  $\frac{1}{2}$  lb.

January 27th I repeated the trial; three perches then weighed 7 cwt. 2 qrs. which is 20 tons *per* acre: I did not weigh them after, as I perceived plainly, from several circumstances, they were arrived at their full weight.

Six beasts were stall-fatted on these 2 acres, of a small home breed, that cost 30*l*: they lasted them 12 weeks, and were then sold for 34*l*. 13*s*. 4*d*. This profit is 2*l*. 6*s*. 8*d*. *per* acre, and 2*s*. 4*d*. a ton.

## EXPENCES.

							£.	s.	d.
Four ploughings,	—	—	—	—	—	—	0	8	0
Five harrowings,	—	—	—	—	—	—	0	1	3
Rolling,	—	—	—	—	—	—	0	0	10
Manuring,	—	—	—	—	—	—	0	10	0
Seed,	—	—	—	—	—	—	0	1	0
Sowing,	—	—	—	—	—	—	0	0	6
Hoeing twice, 6 <i>s</i> . 6 <i>d</i> .	—	—	—	—	—	—	0	13	0
Drawing and carting,	—	—	—	—	—	—	0	10	0
							<hr/>		
Rent, &c.	—	—	—	—	—	—	2	4	7
							1	14	0
							<hr/>		
							3	18	7

## PRODUCE.

							£.	s.	d.
Improvement of the beasts,	—	—	—	—	—	—	4	13	4
Expences,	—	—	—	—	—	—	3	18	7
							<hr/>		
Profit,	—	—	—	—	—	—	0	14	9
Ploughing,	—	—	—	—	—	0 19 6	0	19	6
Harrowing,	—	—	—	—	—	0 3 9	0	3	9
Manuring,	—	—	—	—	—	0 12 6	0	12	6
Carting home,	—	—	—	—	—	1 5 0	1	5	0
							<hr/>		
The above profit,	—	—	—	—	—	—	3	0	9
							0	14	9
							<hr/>		
Loss, <i>i</i> .l. 3 <i>s</i> . 0 <i>d</i> . <i>per</i> acre,	—	—	—	—	—	—	2	6	0

OBSER-

## OBSERVATIONS.

The remarkable circumstance attending this experiment is the uncommon smallness of the produce on a soil excellent for turneps — highly manured with the richest of dung, well cultivated, and growing even to a large size. From the appearance of the crop I had little doubt but it would exceed 40 tons per acre.

This surprising lightness of the turneps, as it was by no means a peculiarity of the season, can be owing to nothing but the uncommon forcing nature of the manure. It was certainly over-dunged; 20 loads per acre of rich hog-dung is an extraordinary dressing; half the quantity, I am convinced by this trial, would have been attended with a greater crop: the growth of the leaves indicated this premature increase strongly, for they spread in an uncommon manner, and carried a most dark and rank green. Twenty loads an acre of common farm-yard dung are a very proper dressing; but the case is different with fresh hog-dung, which is so much stronger than other sorts: the product of this crop, *viz.* 20 tons, would be small, even without any manure at all: I have had 32 on a field no better than this; — and in another part of this field the crop was much finer where the manure was different. This great error in laying on too much hog-dung, explains the reason of the loss on the account being so heavy, for the product certainly amounts not to half what it ought.

The purchase of the beasts for fattening upon these turneps, being at the rate of 15*l.* per acre, is a fresh proof how extremely expensive this culture is, on any scale larger than the regular stock of the farm requires. The variation of that stock in different farms is so great, that it prevents my throwing the purchase of the beasts into the account of the expences of the crop; which would undoubtedly be proper, were it not for such variety. The farmer who cultivates turneps beyond the use of his standing quantity of cattle, ought to consider not only the expences of tillage, hoeing, rent, &c. but also those of the purchase of cattle to eat them, unless he is *sure* of getting a fair price from a neighbour, who will eat them on the ground. For want of this attention, many farmers sow more turneps than they know what to do with, and are thence induced to sell them to be carried off their farms, or else to let them stand for seed; both which methods are equally contrary to good husbandry.

The product of 2*l.* 6*s.* 8*d.* per acre for turneps that weigh but 20 tons, is a true price; at least according to the ideas of this country; and it is a fresh proof that we ought never to rate this crop at the selling price: for I offered these two acres to sale to a sheep-farmer for 30*s.* an acre, to be fed off on the ground, and he refused them; and assured me he could buy as good for 28*s.* I made 46*s.* by them; but the expence of drawing and carting was 17*s.* which reduced it to 29*s.* which was exactly the difference

between

between our prices ; but the manure raised was in one case equal (expences deducted) to the other ; at least I apprehend so : however this is not the comparison of the most consequence ; for when turneps can be sold for a tolerable price to be eaten off the land by sheep, I apprehend it will always be adviseable to sell them, because the saving of trouble and minute attention is immense : but on the contrary, when they cannot be sold in that manner, there is then a necessity for buying beasts to stall-feed upon them.

### EXPERIMENT N<sup>o</sup> 9.

Culture, expences, and produce, of two acres, field O, 1766.

#### CULTURE.

The culture of these acres was, in all respects, similar to the preceding, except in being sown on the 21<sup>st</sup> of July, and also being manured with 20 loads of hog-dung, like N<sup>o</sup> 8, and 20 loads of common farm-yard dung: the rows of heaps laid interchangeably, and spread over each other. The plants rose very favourably ; were hand-hoed twice the middle of August. The last week in December marked three square perches in the best, middling, and worst parts ; and, cutting the tops and tails off, weighed them: they amounted to 14 cwt. 1 qr. which is 38 tons *per* acre. The end of February I weighed other three perches, and they amounted exactly to the same weight.

I used these acres variously : they completed the fatting of two large oxen of 70 and 80 stone, that had had the summer grafs. — The sheep had a quantity of them, and the lean and dry cattle and hogs in the farm-yard had many of them. The application was so various, that I could not make an estimate of their value *per* ton without great difficulty ; but collecting all the minutes I had made, I set down to them with my bailey, and we determined that the cattle had been benefited by them in the following proportions :

	£. s. d.		
The two oxen,	—	—	—
The sheep,	—	—	—
The farm-yard cattle,	—	—	—
The hogs in ditto,	—	—	—
Total,	—	—	—
	4	10	0
	1	15	0
	2	10	0
	0	15	0
	9	10	0

Which is nearly about 2s. 6d. a ton.

EXPENCES.						£.	s.	d.
Four ploughings,	—	—	—	—	—	0	8	0
Five harrowings,	—	—	—	—	—	0	1	3
Rolling,	—	—	—	—	—	0	0	10
Manuring,	—	—	—	—	—	0	10	0
Seed,	—	—	—	—	—	0	1	0
Sowing,	—	—	—	—	—	0	0	6
Hoeing twice,	—	—	—	—	—	0	13	0
Drawing and carting,	—	—	—	—	—	0	19	0
Rent, &c.	—	—	—	—	—	2	13	7
						1	14	0
						4	7	7
PRODUCE.						£.	s.	d.
Value of the food of various cattle,	—	—	—	—	—	9	10	0
Expences,	—	—	—	—	—	4	7	7
Profit,	—	—	—	—	—			
Ploughing,	—	—	—	—	0	19	6	
Harrowing,	—	—	—	—	0	3	9	
Manuring,	—	—	—	—	0	12	6	
Carting,	—	—	—	—	2	7	6	
						4	3	3
Clear profit, <i>oh 9s. 7d. per acre,</i>	—	—	—	—	—	0	19	2

## OBSERVATIONS.

This is a very great and beneficial crop; and its superiority to that of N° 8. can be owing only to the variation of manure: half being common farm-yard dung, qualified the rankness of the hog-dung to the state requisite for a turnep-crop. It had one disadvantage, which was being later sown than N° 8. The product of 38 tons is a very large one for common husbandry to effect, and the value of them at 4*l.* 15*s.* 0*d.* much greater than any buying and selling price of the country. A fresh proof, if any was wanting, that we must not, with this crop, be guided by the rates of the country.

A clear profit of 9*s.* 7*d.* *per acre*, on a manured turnep-crop, is very considerable: for the land is left in admirable order for barley, and a large quantity of dung raised in the farm-yard: both objects of very great importance.

## EXPERIMENT N° 10.

Culture, expences, and produce, of one acre, field O, 1766.

## CULTURE.

The tillage, &c. of this acre was the same as the preceding, and also the time of sowing; but it was manured with a compost, consisting of various sorts of town-manure, farm-yard dung, ditch-earth, turf, &c. &c. 15 loads of it. They were hand-hoed twice, and proved a very good and an equal crop. That I might be satisfied of the weight of it, I marked the beginning of February three square perches in three parts of it, and, cutting the tops and tap-roots off, they weighed 13 cwt. 2 qrs. which is *per* acre 36 tons. I herded this acre out, and fed it off with sheep I joisted at 3*d.* a week. It maintained 40 of them three weeks, which is 30*s.* and after picking up the chief of the leavings, (pieces of turnep the sheep would not eat) I turned in some lean swine that eat them, the value about 2*s.* besides the expence of picking. 36 tons paying 32*s.* is about 10  $\frac{1}{4}$  *d.* *per* ton.

## EXPENCES.

	£.	s.	d.
Four ploughings,	—	—	—
Five harrowings,	—	—	—
Rolling,	—	—	—
Manuring, at 20 <i>d.</i> a load, the cost complete of the compost } from whence taken,	1	5	6
Seed,	—	—	—
Sowing,	—	—	—
Hoing twice,	—	—	—
	1	17	9 $\frac{1}{2}$
Rent, &c.	—	—	—
	0	17	0
	2	14	9 $\frac{1}{2}$

## PRODUCE.

Feeding 40 sheep,	—	—	—
Loss,	—	—	—
Ploughing,	—	—	—
Harrowing,	—	—	—
Manuring,	—	—	—
	0	9	9
	0	1	10 $\frac{1}{2}$
	0	4	8 $\frac{1}{2}$
	0	16	3 $\frac{1}{2}$
Total loss,	—	—	—
	1	19	1 $\frac{1}{2}$



## O B S E R V A T I O N S.

This point of feeding the turneps off with sheep has many circumstances in favour of and against it. The crop does not go near so far as when drawn and carted, either to the yard for cattle, or to a grass-field for sheep. No soil (in this country at least) is so extremely dry as to have no adhesive parts in wet weather. With very little rain the sheep dirty many of the turneps after they have a quarter and half eaten them:—they also dung and stale on them;—and after being used to a bellyfull of those which are clean and good for some time on first coming into them, they grow dainty, and will not touch the turneps so soiled; and by the time they are taken out of the field many are quite trampled under feet so as not to be seen, and not to be eaten even by hungry swine. Upon dry lands I have seen crops eaten fairly up, but never in our soundest turnep loams. This disadvantage of the crop, not going so far as when used differently, amounts to an high proportion of it; for I know from experience, that this crop would, drawn, have paid from 45s. to 60s.

But on the other hand, the expence of drawing and carting is saved by feeding on the land; and this is a very favourable circumstance, not only in the expence, which is high, but also in easing the farmer of a most constant attention: for without that, his servants will never take proper care to supply the cattle regularly: and if they are stall-fed, they will not be near so diligent as they ought in cleaning and littering;—objects of great importance in that mode of consuming turneps. Another saving, by eating the crop on the land, is that of carting out the dung from the farm-yard, which is a business of some expence.

But after whatever attention can be given to the comparison of the two methods, still it will be very difficult to decide absolutely between; for besides conducting two pieces of turneps upon an exactly similar plan of cultivation, and one part fed off with sheep, the other carted home and stall-fed by beasts; accounts must be kept of labour, straw, re-carting the dung, &c. &c. and after all, the experiment must be continued for several years, that the duration of the manuring may be known. I will by no means pretend to assert that I shall accomplish so difficult a point; but I have undesignedly made some progress in it from the crop of 1764, when I tried the comparative profit of the two applications—without any view to more than one successive crop; but as I have kept the minutes of the first part of the experiment, I am determined to continue it, and by that means shall be able, at least, to come nearer the mark than conjecture.

The loss on the account is very heavy in appearance, from the small amount of the crop in value. Although manured turneps cannot be expected upon an average to pay all expences, yet a loss of 40s. *per acre* is in this view considerable: indeed it is manured at a greater expence than common,



as the compost from whence it was taken was registered in every article of expence; which could only be done when the trill is very large, and consisting of various articles. This extra expence in manure, and low value of the application of the crop uniting, cause this greatness of loss.

But the reader is not to judge of the crop in general from the loss or profit, as I have often remarked; this account presents a loss of 40s. an acre, but then two rich manurings are included, one for the turneps, and another in eating them off, and the expences of a fallow also defrayed, all which circumstances undoubtedly are much more than sufficient to convert the loss into profit; for turneps being the first crop of the course, are a preparation for all the following ones, *viz.* barley, clover, and wheat, which crops succeeding an ameliorating one, and two such manurings, cannot fail of all being good;—and the profit of them must certainly depend on the management of the turnep year.

#### EXPERIMENT N° II.

Culture, expences, and produce, of a rood, field M\*, 1766.

##### CULTURE.

I this year continued my general practice of trying what perfection I could carry the culture of turneps to, by means of the utmost exertions of both tillage and manure. This rood yielded wheat in 1765, the stubble of which I ploughed up in the beginning of October with four horses, to as great a depth as possible, gaining about 16 inches. In November spread 5 loads of rotten farm-yard dung on it, which was turned in by a common ploughing. In February the first spring tillage was given. In March it received the fourth earth, and was once harrowed. In May ploughed it twice more, and harrowed it twice. The middle of June spread on it four loads of compost, the same as used in Experiment N° 10, and ploughing it in, harrowed in the seed. The plants rose very finely, and soon came to the hoe; they received three hoeings quickly after each other; my orders were not to let the turneps be left nearer to each other than 18 inches, and the men executed them very accurately; nor did I ever see a finer crop. The first week in January I measured out three square perches, which amounted to 18 cwt. exclusive of the tops and roots, this is 48 tons *per acre*: the three perches contained 168 turneps, consequently the average weight was 12lb. *per turnep*: several weighed about 20lb. and one 27lb. I bought a home-bred heifer to stall-fat on this rood; she cost me six pounds, and I sold her, quite fat from them, for 7l. 6s. which is in the proportion of 5l. 4s. *per acre* for the turneps, and 2s. 2d. *per ton*.

##### EXPENCES.

EXPENCES.						£.	s.	d.
Trench ploughing,	—	—	—	—	—	0	0	6
Six ploughings,	—	—	—	—	—	0	1	6
Five harrowings	—	—	—	—	—	0	0	2
First manuring,	—	—	—	—	—	0	2	3
Second ditto, at 20d.	—	—	—	—	—	0	6	8
Seed,	—	—	—	—	—	0	0	6
Sowing,	—	—	—	—	—	0	0	3
Thrice hoeing, at 4s. 2s. 6d. and 2s.	—	—	—	—	—	0	2	1½
Drawing and carting home,	—	—	—	—	—	0	3	0
						<hr/>		
Rent, &c.	—	—	—	—	—	0	16	11½
						0	4	3
						<hr/>		
						1	1	2½
PRODUCE.						£.	s.	d.
Profit on the heifer,	—	—	—	—	—	1	6	0
Expences,	—	—	—	—	—	1	1	2½
						<hr/>		
Profit,	—	—	—	—	—	0	5	9½
						<hr/>		
Ploughing,	—	—	—	—	0 4 10½			
Harrowing,	—	—	—	—	0 0 5½			
Manuring,	—	—	—	—	0 11 3			
Carting home,	—	—	—	—	0 7 6			
						<hr/>		
The above profit,	—	—	—	—	—	0	5	9½
						<hr/>		
Loss, 3l. 13s. 2d. per acre,	—	—	—	—	—	0	18	3½

## OBSERVATIONS.

This is a most noble crop in quantity. Before I began to attend accurately to the weighing my crops, I could not have conceived that an acre could have produced so vast a quantity as 48 tons: but I am not clear that even a larger produce than this may not be gained by future improvements: for this crop certainly would have admitted a much larger produce; for many of the turneps were small, that stood in spaces that would have admitted their being larger. Future trials will decide to what weight I shall be able to carry an acre.

Relative to the loss of 3l. 13s. 2d. per acre, it should be observed by the reader, that in a trial of this sort, which is conducted at so great an expence, he is never to look to the crop itself for a reimbursement of the expences;

expences; it should be considered as a costly preparation for corn, &c. So very rich an improvement as the double manuring for these turneps succeeded by an ameliorating hoeing crop, which kills all the weeds, with the vast quantity of dung raised by the consumption of the turneps, altogether forms a system of manuring, cheaply purchased at the rate of 3*l.* 13*s.* 0*d.* *per* acre. \* Many of our farmers spread large quantities of Bury dung on their fields, at a much larger expence than this: for they none of them bring a load under ten or a dozen shillings, and from six to eight loads are the common dressing *per* acre. — Now I am absolutely confident, from repeated experiment, and general observation, that the manurings here acquired for 3*l.* 18*s.* 0*d.* an acre, is far beyond double the advantage from the town dressing: hence I shall not scruple to think, that the purchase of three such manurings, at the expence of 3*l.* 18*s.* 0*d.* is cheap management: for the land is left in such great heart, that it cannot fail of yielding immense crops for many years. — Probably the soil will for ever be the better for such a year of improvement; at least if it continues to be well farmed. Thus we should never be alarmed at a large ballance on the wrong side of such an account as this: for it should ever be considered as the purchase of the manure the land gains.

The produce of 5*l.* 4*s.* 0*d.* *per* acre is very great; and shews in the value and quantity, that, with due management, the crop is proportioned to the expence bestowed. — That the land was not over-manured, is plain from the vastness of the produce. This might be owing to the trench-ploughing, which gave the roots such space to spread in, and such a quantity of earth to mix with the dung, that I apprehend a much larger portion would not have overdone it.

The purchase of the stock for eating this crop is at the rate of 24*l.* *per* acre. This is another proof of the vast sums of money a man ought to have in his pocket, who goes spiritedly into the turnep culture: without plenty of cash to purchase cattle, he will go to work without his tools; and the amount of this expence is many times greater than all the articles of culture united. Men in conversation, and all the writers I remember to have read, speak of these branches of culture, relative to expence, only in the stile of the ploughing, harrowing, manuring, &c. &c. whereas the purchase of the cattle is as much an article to be considered, and belonging to the turneps, as the ploughing or the hoeing; but from the variety of other circumstances attending it, cannot, in such experiments, be registered, though I shall afterwards calculate this article among others.

#### EXPERIMENT N° 12.

Culture, expences, and produce, of a rood, field L\*, 1766.

#### CULTURE.

This piece yielded wheat in 1765, in the utmost perfection of both tillage and manure. The stubble was ploughed up in October on to the ridge,

ridge, and the land well water-furrowed. In March gave it the first spring tillage, by reversing the ridges: stirred it again in April, throwing the ridges flat, five together, and harrowed. In May ploughed it twice more, and harrowed it four times: left it so till the middle of June, when the last earth was given, and the seed harrowed in. The plants arose very favourably, and flourished away greatly: they were hand-hoed thrice, each time pretty soon after the other, and left at the distance of 18 inches from plant to plant. The beginning of January I measured out three square perches at the best part of the piece, at the worst, and where it was middling: but the variations were not great; for it was a very equal crop. The weight of the three perches 15 cwt. 3 qrs. or *per* acre 42 tons. The end of February marked three other perches; the weight 17 cwt. 1 qr. or *per* acre 46 tons: the medium 44 tons. They were used variously, so that I could not calculate the value *per* ton: I shall, therefore, estimate them at 2s. 2d. the value of Experiment N<sup>o</sup>. 11.

## EXPENCES.

					£.	s.	d.
Six ploughings,	—	—	—	—	0	1	6
Seven harrowings,	—	—	—	—	0	0	2½
Water-furrowing,	—	—	—	—	0	0	1½
Seed,	—	—	—	—	0	0	1½
Sowing,	—	—	—	—	0	0	0½
Thrice hoeing, at 4s. 2s. 6d. and 2s.	—	—	—	—	0	2	1½
Drawing and carting,	—	—	—	—	0	2	9
					0	6	10½
Rent, &c.	—	—	—	—	0	4	3
					0	11	14½

## PRODUCE.

					£.	s.	d.
11 tons, at 2s. 2d.	—	—	—	—	1	3	10
Expences,	—	—	—	—	0	11	14½
Profit,	—	—	—	—	0	12	8½
Ploughing,	—	—	—	—	0	3	7½
Harrowing,	—	—	—	—	0	0	7½
Carting home,	—	—	—	—	0	6	10½
					0	11	2
Clear profit, <i>ol.</i> 6s. 1d. <i>per</i> acre,	—	—	—	—	0	1	6½

## OBSERVATIONS.

This experiment surprised me: I expected a larger crop from land in such excellent order; which had received three manurings, and a whole year of tillage preparatory to the wheat. But turneps, in whatever manner cultivated, will never pay for great expences, or even answer the introduction in a course when the soil is in great heart, in immediate profit. They can only answer as a fallow, when the refunding the rent and expences of the fallow is alone the object; and the expence of cultivating them is so great, that the largest crops which can grow will scarcely pay expences. This amounts to near 5*l.* an acre, and yet the profit is but 6*s.* and there is no charge of manuring; but the carting home comes almost to 40*s.* But on the contrary, if that expence was saved, by the crop being fed off, the value of it would be lessened from 5*l.* to 40*s.* at most; so that the account would be in a yet worse situation. Besides, upon this land they could not be fed off: it is not half dry enough. All this proves, that the farmer is not to look for profit from turneps in the turnep year: this advantage is absolutely of another nature: he might as well expect the principal profit of wheat to be in the straw. They come in the course, between two corn crops—kill all the weeds that are got a-head in the land, and raise a very large quantity of manure; so that the soil is always kept in heart, and clean, merely from a proper portion of the farm being under turneps. For suppose barley or oats to succeed the wheat, then the turneps must follow them, under the disadvantage of the land being too much exhausted, and very full of weeds, which must be the case after two crops of corn. The turneps could not be equal to these, but certainly more unprofitable; and the quantity of their product being lessened, lessens the quantity of succeeding manure, and consequently damages all the crops which follow. Let, therefore, the husbandman expect nothing more from turneps than to pay him the expences of his fallow, and to raise a large quantity of dung. These are as much as he can, with any reason, look for from turneps:—a fallow paying itself, and yielding its own manure, is surely a vast acquisition in husbandry, when compared with the barren expence of a common summer fallow.

This trial proves one thing, which is contrary to the general opinion. It has often been asserted, that turneps can only be profitably cultivated on very dry soils: now this field is a clayey loam, and naturally wet; but rich manurings on this piece have had the effect of drying it much: however, under these turneps it yet remained a wet adhesive soil, and yet the turneps came to the great produce of 44 tons, which is certainly equal to what they would have been on dryer lands: they were also well tasted, and not sticky. This shews that they will do well on these soils, and especially if manured richly.

But on the other hand it should be observed, that however large the plants may grow on this soil, yet I do not recommend the sowing it in all cases as good husbandry. It will not bear feeding off; and in carting off, unless a good deal of management is used, and dry seasons taken for the work, the land is sadly poached, to the undoubted damaging of the following crop. The best way, with a whole field, would be to send boys and girls in to draw the turneps and cut off their tops, and lay the apples in rows, five or six perches asunder; by which means they would lay ready for the waggons or carts to take them, without making many tracks. Indeed, contrivances might be effected to get them off the land without going on at all; but as no such invention has yet appeared, one cannot speak more particularly to the point.

EXPERIMENT N<sup>o</sup> 13.

Culture, expences, and produce, of one acre, field T, 1767.

## CULTURE.

The first tillage of this acre was given in October 1766, when it was ploughed on to the ridge, and water-furrowed: reversed the ridges in March; in April ploughed them flat, throwing five of them together, and harrowed them. Gave another ploughing in May, and another harrowing. The second week in June ploughed, sowed, and harrowed. The plants arose well, and escaping all attacks of the fly, were hand-hoed twice. The latter end of October I measured three square perches in places that gave the fair average of the piece, and found the weight to be 9 cwt. which is 24 tons *per* acre. Respecting the value, I cannot give any minutes, not staying on the farm: but I shall charge them at the price offered to feed off with sheep, which was 30s. and makes 1s. 3d. a ton.

EXPENCES.					£.	s.	d.
Five ploughings,	—	—	—	—	0	5	0
Four harrowings,	—	—	—	—	0	0	6
Water-furrowing,	—	—	—	—	0	0	6
Seed,	—	—	—	—	0	0	6
Sowing,	—	—	—	—	0	0	3
Hoeing,	—	—	—	—	0	6	0
					<hr/>		
					0	12	9
Rent,	—	—	—	—	0	17	0
					<hr/>		
					1	9	9

P R O D U C E.					£.	s.	d.
24 ton, at 1s. 3d.	—	—	—	—	1	10	0
Expences,	—	—	—	—	1	9	9
Profit,	—	—	—	—	0	0	
Ploughing,	—	—	—	0 12 2½			
Harrowing,	—	—	—	0 1 6			
				<hr/>	0	13	8½
The above profit,	—	—	—	—	0	0	3
Loss,	—	—	—	—	0	13	5½

## O B S E R V A T I O N S.

This loss is not more than there was reason to expect, and it is much more than paid by the advantages of the preparation for spring corn, in tillage, hoeing, and manuring by the sheep. The product of 30s. fed off, for 24 tons, I do not think a bad price: turneps will not often sell better; and as the expence of drawing, carting, &c. is saved, the profit on the crop is not upon the whole small.

## G E N E R A L O B S E R V A T I O N S O N T H E S E E X P E R I M E N T S.

A clear idea is not to be formed from the miscellaneous effect of various trials; all of which are different, and some contradictory. It is absolutely necessary to draw every particular into one point, that it may convey a clear and accurate idea of the subject. In experimental husbandry, a few trials, separately taken, are not of great consequence. It is the combination of many, from which an average may be drawn, that gives the decisive authority, which every one may be supposed to seek, when information from a genuine source is his object. I shall here pursue the conduct I have before adhered to, of drawing the average of each article.

E X P E N C E S.					£.	s.	d.
Experiment No 1,	—	—	—	—	2	11	6½
Ditto,	—	—	—	—	1	18	1
2,	—	—	—	—	2	14	7½
3,	—	—	—	—	2	6	3½
4,	—	—	—	—	6	10	3
5,	—	—	—	—	2	15	4½
6,	—	—	—	—	2	10	7
Carried over,	—	—	—	—	21	6	9½



				£.	s.	d.
Brought over,	—	—	—	21	6	9½
Experiment N <sup>o</sup> 7,	—	—	—	4	17	4
8,	—	—	—	3	9	8
9,	—	—	—	4	5	5
10,	—	—	—	3	11	1½
11,	—	—	—	9	1	1
12,	—	—	—	4	9	3
13,	—	—	—	2	3	5½
				53	4	1

Average, 3*l.* 16*s.* 0*d.*

Of these 14 trials, the following are simple; neither manured nor carted home:

N <sup>o</sup> 1,	—	—	—	1	18	1
5,	—	—	—	2	15	4½
6,	—	—	—	2	10	7
13,	—	—	—	2	3	5½
				9	7	6

Average, 2*l.* 6*s.* 10½*d.*

The following are both manured and carted home

N <sup>o</sup> 4,	—	—	—	6	10	3
7,	—	—	—	4	17	4
8,	—	—	—	3	9	8
9,	—	—	—	4	5	5
11,	—	—	—	9	1	1
				28	3	9

Average, 5*l.* 12*s.* 9*d.*

The following not so complex, only manured :

N <sup>o</sup> 1,	—	—	—	2	11	6½
10,	—	—	—	3	11	1½
				6	2	7½

Average, 3*l.* 1*s.* 3½*d.*



And lastly, the following only carted home:

				£.	s.	d.
N <sup>o</sup> 2,	—	—	—	2	14	7½
3,	—	—	—	2	6	3½
12,	—	—	—	4	9	3
				9	10	2½

Average, 3*l.* 3*s.* 4½*d.*

#### RECAPITULATION.

Neither manured nor carted,	—	—	—	2	6	10½
Manured,	—	—	—	3	1	3½
Carted,	—	—	—	3	3	4½
Both manured and carted,	—	—	—	5	12	9

This little table presents, at one view, the nature of the turnep culture, relative to the expences. It appears plainly, that the crops, which are manured for, and carted home, are extremely expensive, even to an amount which can hardly be repaid by the noblest ones. The account, indeed, includes some trials that were cultivated in the complete manner, which raises the average. But it is sufficiently evident upon the whole, that the articles of manuring and carting home are those, which most raise the expences of the turnep crop.

The article carting is higher than manuring; for it is 3*l.* 3*s.* 0*d.* whereas the other is only 3*l.* 1*s.* 0*d.* This great expence is owing to the largeness of the crops. The number of loads on an acre of good turneps is prodigious, generally amounting, with the tops, tap-roots, and some dirt, (which cannot possibly be cleared in the field, as making the teams wait would cost more than the gain) to two loads *per* ton of the apples clean. If a crop weighs 40 tons, tops, tails, and dirt clean off, there will be 80 loads of turneps in the rough. This extent of carting cannot fail (in any farm) of being a very heavy expence, and consuming a great proportion of the produce of the crop. My method of carting was sometimes to bring home half a day's work at a time; at others, to bring as many at once as would last the cattle three or four days; and often made the man, who had the care of them, cart it as wanted. But not having fattened beasts on the large scale of many farms, and the management being of great importance, I shall offer a few hints on the probable means of lessening so great an expence.

The material point must always be to proportion the men and horses to the quantity of fattening cattle; and the ability of doing this is a circumstance

stance annexed to a large business. Upon a small farm, the sitting cattle fall to the care of the *odd man*, who generally takes all the work left, or neglected by the 'other men, at the same that he has five times as much of his own as any of the rest. In little farms this is only a boy, and much business thereby sadly done, and yet more not done at all.

The beasts in such farms often are without food; because all the horses are employed in other business, — and seldom get any regularly, without other work suffering. But if a man would have all parts of his business adequately profitable, he must sat beasts enough totally to employ a man in bringing the turneps, giving them to the beasts, and in cleaning and littering them. One active fellow would attend a great many, if the farm-yard was conveniently disposed. (But this point will be more particularly treated hereafter). He should have one horse always ready, and a small three-wheeled cart, to bring an equal number of loads every day for the cattle: and to save carting uselessly, he should draw the turneps, cut their tops, and tap-roots off, stroke off the adhering dirt in the field, before he came with the cart; and the turneps being laid in a regular row, would be quickly loaded; and the cart would carry much more at once than in the common way. A few days would discover very nearly the number of beasts he could with convenience manage. This method would ensure the beasts being well taken care of, and the expence of carting would be vastly lower than in common; probably it would 'not amount to a third: an object highly worth the attention of those who cultivate turneps on a large scale for the purpose of stall-feeding.

When the number of beasts is very great, it would be a further improvement to keep a cart and man constantly at work in bringing the turneps, and a boy in topping and cleaning them, with other men for feeding and cleaning. This would be a great reduction of expence, as there is necessarily a loss when a man changes from one work to another, often in a day. — But to return.

The expence of the crops neither manured nor carted, viz. 46s. *per* acre, shews, that the turnep culture is in every state rather expensive: for a crop to cost that sum which is consumed on the ground, and has no expences of harvest, carting, threshing, &c. &c. is extremely high, and requires uncommon crops in that method of consuming to pay the expence; and this shews, that our farmers have a very just idea of the turnep culture. They think themselves very well off, if they get 30s. for an acre of good turneps to be fed off with sheep, and they reckon the manure they leave on the ground to be worth 30s. more, which, upon the whole, they think renders the crop a profitable one: but without including the manure, they esteem the loss not trifling. This is exactly the case; the price only leaves 16s. an acre *less*; but the manure carried to account gives 11s. profit. And this state of the expences in general proves, that no farmer

should cultivate turneps with any other view than that of cleaning and manuring his farm; for the cost is so great, that in no other light will the crop be profitable.

P R O D U C E.					£.	s.	d.
Experiment N <sup>o</sup> 1,	—	—	—	—	2	0	0
Ditto,	—	—	—	—	0	5	0
2,	—	—	—	—	3	2	0
3,	—	—	—	—	2	12	6
4,	—	—	—	—	4	11	0
5,	—	—	—	—	0	14	4½
6,	—	—	—	—	0	11	0
7,	—	—	—	—	4	12	0
8,	—	—	—	—	2	6	8
9,	—	—	—	—	4	15	0
10,	—	—	—	—	1	12	0
11,	—	—	—	—	5	4	0
12,	—	—	—	—	4	15	4
13,	—	—	—	—	1	10	0
					38	10	10½

Average, 2*l.* 15*s.* 0*d.*

The produce of the trials that were neither manured nor carted home are as follow :

Experiment N <sup>o</sup> 1,	—	—	—	—	0	5	0
5,	—	—	—	—	0	14	4½
6,	—	—	—	—	0	11	0
13,	—	—	—	—	1	10	0
					3	0	4½

Average, 0*l.* 15*s.* 1*d.*

The following both manured and carted home

Experiment N <sup>o</sup> 4,	—	—	—	—	4	11	0
7,	—	—	—	—	4	12	0
8,	—	—	—	—	2	6	8
9,	—	—	—	—	4	15	0
11,	—	—	—	—	5	4	0
					21	8	8

Average, 4*l.* 5*s.* 9*d.*

The

The following were manured, but not carted :

					£.	s.	d.
Experiment N <sup>o</sup> 1,	—	—	—	—	2	0	0
10,	—	—	—	—	1	12	0
					<hr/>		
					3	12	0

Average, 1*l.* 16*s.* 0*d.*

And lastly, the following carted home, but not manured :

Experiment N <sup>o</sup> 2,	—	—	—	—	3	2	0
3,	—	—	—	—	2	12	6
12,	—	—	—	—	4	15	4
					<hr/>		
					10	9	10

Average, 3*l.* 9*s.* 11*d.*

Deducting N<sup>o</sup> 12. which succeeded wheat in perfection of manuring, the average is 2*l.* 17*s.* 3*d.*

#### RECAPITULATION.

Average of the trials neither manured nor carted,	—	0	15	1
Ditto both manured and carted,	—	4	5	9
Ditto manured only,	—	1	16	0
Ditto carted only,	—	3	9	11
Ditto, rejecting N <sup>o</sup> 12.	—	2	17	3

It is sufficiently clear from this table, that the means of carrying the value of the produce of turneps the same year to the greatest height, is not only by manuring, but also by desisting from feeding the crop on the land : carting it home for stall-fed beasts, or lean cattle, or to a grass field for sheep, advances the product higher even than manuring. This should be noted well ; for many unexperienced cultivators might imagine the only way to make the turneps speedily pay a profit, would be by manuring for them well, to ensure a great crop : — but, without entering into the comparison respecting manure, we may venture to assert, that the carting them home is a much more certain method of bringing a quick repayment of the expences.

The product of the crops neither manured nor carted home is so trifling, that it shews such omissions united are destructive of the value of the product *per acre* : 15*s.* is a crop that may be called a nothing. Its being so very low, is partly owing to the year 1765 being so unfavourable ; most of the

the crops that year quite failed : — but then such failures I attribute, in some measure at least, to the want of manure. Crops failed from two causes : first, the extreme dryness of the soil preventing the vegetation of the feeds ; and, secondly, the plants being eat up by the fly as soon as they arose. The first cause manure would probable not have prevented ; though that is not very clear, supposing it to attract moisture : but the second evil it is extremely efficacious in preventing, by giving the turneps a quickness of growth sufficient to escape them. It is true many crops failed that were well manured ; but it is impossible to advance any propositions in such matters that do not admit numerous exceptions.

The importance of manuring for turneps is further to be considered, in respect of the improvement of the land, not from the crop itself ; for in that the effect would be the same to all crops ; but in the increase of product, enabling you to fat so many more cattle, and consequently raise so much the more dung ; which is an object of very great importance ; and without its possessing a great degree of attention, the farm, in general, must suffer much. Whoever would make his business turn out really profitable, must give especial attention to every thing concerning manures ; and the maintaining great stocks of cattle throughout winter is the surest and cheapest method of improving land by manure.—The particulars relative to the quantity of dung, arising from given stocks of cattle, will be considered in another place.

The following products, in weight, will shew the proportions of the manured and unmanured.

Experiment N <sup>o</sup>						Tons.
1,	—	—	—	—	—	16
Ditto,	—	—	—	—	—	3
2,	—	—	—	—	—	32
3,	—	—	—	—	—	17
4,	—	—	—	—	—	41
5,	—	—	—	—	—	5
6,	—	—	—	—	—	3
7,	—	—	—	—	—	46
8,	—	—	—	—	—	20
9,	—	—	—	—	—	38
10,	—	—	—	—	—	36
11,	—	—	—	—	—	48
12,	—	—	—	—	—	44
13,	—	—	—	—	—	24

Average, 26  $\frac{1}{2}$  tons.

373

The

The following experiments were manured.

						Tons.
N <sup>o</sup> 1,	—	—	—	—	—	16
4,	—	—	—	—	—	41
7,	—	—	—	—	—	46
8,	—	—	—	—	—	20
9,	—	—	—	—	—	38
10,	—	—	—	—	—	36
11,	—	—	—	—	—	48
12,	—	—	—	—	—	44
						<u>289</u>

Average, 36 tons.

And the following unmanured.

						Tons.
N <sup>o</sup> 1,	—	—	—	—	—	3
2,	—	—	—	—	—	32
3,	—	—	—	—	—	17
5,	—	—	—	—	—	5
6,	—	—	—	—	—	3
13,	—	—	—	—	—	24
						<u>84</u>

Average, 14 tons.

Weight of the manured,	—	—	—	—	—	36
Ditto of the unmanured,	—	—	—	—	—	<u>14</u>
Superiority,	—	—	—	—	—	<u>22</u>

This comparison is, of very great importance. No husbandman can give too much attention to the difference of the manured and unmanured crops of all sorts. In these of turneps we find the manured upon an average to be to the unmanured as 1 to 2½: a superiority that proves, in the most undeniable manner, the necessity of dunging for turneps, if great crops would be had.

There are numerous and weighty reasons to be added to the result of these trials, if reason was wanting to confirm experiment. The proportion of the crops is that of the cattle maintained, and, consequently, of the dung raised; so that supposing *A* has an acre of turneps manured, which yields

36 tons, and *B* an acre that gives 14 tons, *A* will have 36 loads of dung to *B*'s 14. Suppose *A* lays his quantity on to his acre for barley, and *B* the same: suppose the crop of *A* 8 quarters; *B*'s, undoubtedly, will be little more than 3 quarters: if *A*'s succeeding clover yields  $2\frac{1}{2}$  tons of hay, *B*'s will yield but 1 ton; and in the following wheat, *A* will be equally superior: for though it may be alledged that the manure will wear out, yet 14 loads are more liable to that evil than 36; and when the turneps come round again, the superiority will bring a fresh advantage for the next course. It is in this manner that a superiority in one crop which is food for cattle, occasions an amazing train of advantages which the inferior one can never reach.

Nor is it only in the manure that the superiority of a great crop of turneps lies; the thickness of the shade is a point by no means to be slighted. All leguminous crops, when thick on the land, breed the putrid fermentation I have so often mentioned, which is of great consequence as a preparation for the ensuing crop; this is upon the same principle that a great crop of pease prepares for wheat infinitely better than a small or middling crop.

PROFIT and LOSS.						£. s. d.		
Experiment N <sup>o</sup> 1,	Loss,	—	—	—	—	0	17	8½
Ditto,	—	—	—	—	—	1	13	1
4,	—	—	—	—	—	1	19	3
5,	—	—	—	—	—	2	1	0½
6,	—	—	—	—	—	2	1	7½
7,	—	—	—	—	—	0	5	4
8,	—	—	—	—	—	1	3	0
10,	—	—	—	—	—	1	19	1½
11,	—	—	—	—	—	3	13	2
13,	—	—	—	—	—	0	13	5½
						16	6	8½
N <sup>o</sup> 2,	Profit,	—	—	—	—	2	7	4½
3,	—	—	—	—	—	0	6	2½
9,	—	—	—	—	—	0	9	7
12,	—	—	—	—	—	0	6	1
						2	9	2½
Loss,	—	—	—	—	—	15	17	6
Average, 1 <i>l.</i> 2 <i>s.</i> 9 <i>d.</i>								

The following of these experiments were neither manured nor carted home.

					£.	s.	d.
Experiment N <sup>o</sup> 1, Loss,	—	—	—	—	1	13	1
5,	—	—	—	—	2	1	0½
6,	—	—	—	—	2	1	7½
13,	—	—	—	—	0	13	5½
					6	9	2

Average, 1/. 12s. 3½d.

The following were both manured and carted.

					£.	s.	d.
Experiment N <sup>o</sup> 4, Loss,	—	—	—	—	1	19	3
7,	—	—	—	—	0	5	4
8,	—	—	—	—	1	3	0
11,	—	—	—	—	3	13	2
					7	0	9
N <sup>o</sup> 9, Profit,	—	—	—	—	0	9	7
					6	11	2

Average, 1/. 6s. 2½d.

The following manured, but not carted.

					£.	s.	d.
Experiment N <sup>o</sup> 1, Loss,	—	—	—	—	0	17	8½
10,	—	—	—	—	1	19	1½
					2	16	9½

Average, 1/. 8s. 4½d.

And lastly, the following carted, but not manured.

					£.	s.	d.
N <sup>o</sup> 2, Profit,	—	—	—	—	0	7	4½
3,	—	—	—	—	0	6	2½
12,	—	—	—	—	0	6	1
					0	19	7½

Average, 0/. 6s. 6½d.



## RECAPITULATION.

				£.	s.	d.
Neither manured nor carted, Loss,	—	—	—	1	12	3½
Both manured and carted, Loss,	—	—	—	1	6	2½
Manured, but not carted, Loss,	—	—	—	1	8	4½
Carted, but not manured, Profit,	—	—	—	0	6	6½

This state of the crops offers several considerations that demand attention. Every article being attended with loss, except the fields carted home, without being manured, shews, that the carting the crops makes them go so far as to pay all the expences, and yet leave a profit, while every other mode is attended with a considerable loss. That the loss of so many divisions is not only owing to the expence of the manurings, appears from the first in the list being attended with the greatest loss.

The general loss on these experiments, *viz.* 1*l.* 2*s.* 9*d.* must not prejudice the reader against the turnep culture. *Loss!* on the ballance of an account sounds badly; but then many circumstances of great consequence operate strongly for manuring, but take no place in the account. Turneps are not one of the crops from which the farmer expects great profit to pay rent and heavy expences, like wheat, barley, clover, &c. &c. They are by no means to be viewed in that light. This seeming loss renders it necessary to state the matter with as much precision as possible.

This crop is to be considered only as a substitute for a fallow. Before turneps were introduced into England, the year which now is appropriated to that root, was then the year of fallow,—mere tillage:—and this is yet the case with many parts of the kingdom that have not adopted the turnep culture. This is the light in which we must consider them.

Suppose on these soils the fallow husbandry yet in being, the account of an acre would, on an average of years, be as follows:

					£.	s.	d.
Rent,	—	—	—	—	0	17	0
Five ploughings,	—	—	—	—	0	14	2
Harrowing,	—	—	—	—	0	1	0
Total,	—	—	—	—	1	12	

Now, with the unmanured, like this fallow, 6*s.* 6½*d.* profit is made; so that the ballance is 1*l.* 18*s.* 0*d.* in favour of the turneps: to this 1*l.* 18*s.* 0*d.* is to be added the value of the dung, by the expenditure of the crop; which is an object of the first magnitude: so that the ballance  
of

of the account, in favour of the turneps, is very great. In another light also a great superiority will appear. The loss by the crop, neither manured nor carted, amounts to 1*l.* 12*s.* 0*d.* the same as the expence of the fallow; — so that the two accounts are just a ballance: but then comes the weight, which at once turns the scale. These crops are fed on the land; so that the turneps yield a most rich and ample manuring: the difference, therefore, is very great; for the barley, which follows turneps fed off the land, will be incomparably better than after a fallow without any manure. In these lights the value of the turnep culture sufficiently appears: in them we find that the ballance of the turnep account the first year, notwithstanding its being a considerable loss, becomes as important a profit when all the collateral circumstances are considered. Nor should a false idea be entertained of the extent of these advantages; for the annual ballance of a crop that gives a rich manuring to the land will be very considerable, and last for a long time, with good management. After the turneps, spring-corn should universally succeed, (unless they are fed off time enough to sow wheat, which is scarcely ever the case) and with it clover; by which means you not only gain a great crop of barley, but lay the land to grasses while it is in very good heart, and soon after the manuring. It is a well known fact, that clover exhausts not the soil of its fertility; but, on the contrary, adds to it: so that the store of fertility in the soil is kept in a state of increase while the clover is on the land, as well from the manure lodged in the soil, as from the noble shade and thickness of the crop, which is alone, in some crops, equal to a common manuring. Thus is the wheat deposited on the clover stubble while the land is in such vast heart, that a capital crop must be the unavoidable consequence: and the soil left by it in such a state, that the farmer need not be apprehensive of having a good one of turneps from the communicated virtue yet remaining in the land: so that the course in its whole progress keeps the soil constantly in heart, and upon the acquiring hand, which should be the aim of every farmer.

Another review we must take of these experiments, is that of the price *per ton*, to draw an average of the whole.

			£.	s.	d.
Experiment N <sup>o</sup> 1.	Carted for feeding lean cattle and sheep,		0	2	6
N <sup>o</sup> 2.	Ditto fatting black cattle, — —		0	1	11
N <sup>o</sup> 3.	Ditto feeding stock-sheep, — —		0	3	1
N <sup>o</sup> 4.	Ditto fatting cows, — —		0	2	3
N <sup>o</sup> 5.	Ditto feeding sheep and hogs, — —		0	2	4
N <sup>o</sup> 6.	Ditto, — — —		0	3	0
N <sup>o</sup> 7.	Carted for the sheep, — —		0	2	0
N <sup>o</sup> 8.	Ditto for fatting beasts, — —		0	2	4
N <sup>o</sup> 9.	Ditto for various cattle, — —		0	2	6
Carried over,	— — —		1	1	11

					£.	s.	d.
Brought over,	—	—	—	—	1	1	11
Experiment N <sup>o</sup> 10, Fed on the land by sheep,	—	—	—	—	0	0	10½
N <sup>o</sup> 11, Carted for fattening heifers,	—	—	—	—	0	2	2
N <sup>o</sup> 13, Fed on the land by sheep,	—	—	—	—	0	1	3
					1	6	2½

Average, ol. 2s. 2d.

This table admits of three divisions. *First*, The crops carted home for fattening beasts. *Second*, Those carted home for the lean stock. And, *Third*, Those that were fed on the land. — The crops carted for fattening are the following:

					£.	s.	d.
N <sup>o</sup> 2,	—	—	—	—	0	1	11
4,	—	—	—	—	0	2	3
8,	—	—	—	—	0	2	4
11,	—	—	—	—	0	2	2
					0	8	8

Average, ol. 2s. 2d.

#### Carted for lean cattle.

					£.	s.	d.
N <sup>o</sup> 1,	—	—	—	—	0	2	6
3,	—	—	—	—	0	3	1
5,	—	—	—	—	0	2	4
6,	—	—	—	—	0	3	0
7,	—	—	—	—	0	2	0
9,	—	—	—	—	0	2	6
					0	15	5

Average, ol. 2s. 6½d.

#### Fed on the land.

					£.	s.	d.
N <sup>o</sup> 10,	—	—	—	—	0	0	10½
13,	—	—	—	—	0	1	3
					0	2	1½

Average, ol. 1s. 0½d.

## RECAPITULATION.

			£.	s.	d.
Value <i>per</i> ton, by carting, for lean stock,	—	—	0	2	6½
Ditto, by carting, for fattening beasts,	—	—	0	2	2
Ditto by feeding on the land by sheep,	—	—	0	1	0½

I cannot reflect a moment on the great utility of knowing the average value of turneps *per* ton, without expressing some surprize that so many practical writers should have treated of this very valuable root, and yet never thought of ascertaining its real worth: it is for want of such precision that we see so many experiments so little experimental. With all sorts of corn, pulse, &c. the case is different; they always bear a price that is fixed for the time; varying but little in a season, in experiments on them there is no other method to be followed but to charge the products at the market price, which is perfectly satisfactory in nineteen instances out of twenty. But how do our experimental writers value turneps? They value them not at all in many instances, giving only the weight *per* acre; but when a value is fixed, it is that merely of the selling price of the neighbourhood. I think I have proved clearly enough that such a valuation is worse than none, since it is in many cases an error of more than *half*; and in some cases *two thirds*. But if the crops are not valued accurately, how are the accounts of them to be settled? How is the balance of profit and loss to be struck?

It was these reasons that induced me to attend particularly to the value of my crops:—to reject the nominal rate, and discover the real one: the result may perhaps be of use to others, not only as a rule to value their crops by when they have formed none for themselves,—but as a hint that may be easily pursued in different places, until a general average is gained which includes all variations. I do not think soils, or crops, will occasion any variations; but the different breeds of cattle may cause some; for there certainly is a great difference in the profit of feeding cattle, from the nature of the beasts; some will fat or feed much more kindly than others. The general average of these crops, *viz.* 2s. 2d. *per* ton, appears to me a low price when compared with that of all other sorts of winter food; hay yields from 30s. to 50s. suppose the average 36s. what an immense difference between 2s. 2d. and 36s.! one ton of hay to be worth 17 of turneps. I apprehend the average price of such straw as is proper to feed cattle with, is about 14s. a ton, so that one ton of straw is thus as good as above six of turneps; and yet the former will only feed lean cattle, whereas the latter will fat beasts. This appears somewhat contradictory; but yet the fact relative to the turneps is perfectly decisive.

The comparative table gives the proportionate value in different applications. Much the most profitable use of the crop is the carting it home for the feeding lean cattle; it pays *2s. 6½d. per ton*, whereas feeding it on the land by sheep yields not half this sum: which shews that a prodigious waste is made in that way of expending the crops; a point of no slight consequence, and especially as those farmers who are particular advocates for this management assert the contrary; insisting that the crops go to the utmost as far in the feeding on the land, as in drawing and carting home: a surprising mistake!

There is another view in which to consider some of these crops; the value *per acre* of the stock necessary for them. It is an enquiry of particular importance, that when a farmer cultivates a field of turneps for stall-feeding cattle, he may know before-hand what sum of money *per acre* he must appropriate to the buying stock for the crop, on an average of several years.

Crops.		Tons.	Value of stock per acre.		
			£.	s.	d.
N <sup>o</sup> . 2,	—	32	12	8	0
4.	—	41	31	15	0
8,	—	20	15	0	0
11,	—	48	24	0	0
		<hr/> 141	<hr/> 83	<hr/> 3	<hr/> 0
Average weight per acre, 35 tons,			£.	s.	d.
— stock per ton,			0	11	9
— stock per acre,			20	15	9
The average weight of all the crops being 26½ tons, the			15	11	4
stock per acre would be					

Now these sums may appear very high to some persons who have not attended particularly to this point; but they are to consider that some of these crops were not eat by the stall-fed cattle for a whole winter together, as some farmers manage; in that case the requisite sum may be much smaller: you certainly *may* put the beasts to turneps in September, and keep them fattening till April; but this is not the profitable conduct; for the crops are begun before they are arrived at perfection, and they are kept long after they begin to decline both in weight and quality. It is more profitable to fatten during a mean period, while the turneps are in perfection; besides, no man should be tied by want of money to act in a prescribed manner, whether he thinks it right or not: although a quick fattening may be much more profitable than a continued one, and although turneps are very liable, late in the spring, to be destroyed or worthless, after standing

standing repeated attacks from frost—yet is such farmer forced to run the worst chances, against his judgment, for want of money. I shall easily be pardoned for not accommodating my experiments to suppositions of very bad management.

But the state of the fact requires no such supposition; small or middling-sized beasts will completely fat in four months as well as in ten, unless their food is changed: I mean beasts that weigh, when fat, from 20 to 40 stone (14 lb.) and four months may be taken in the winter, while the turneps are in full perfection, *viz.* November, December, January and February; but who can think the value of the crop would be the same used in eight months instead of four, that is September, October, March, and April added to the list?

For these reasons I think the preceding table of stock by no means exaggerated; but on the contrary, shews the money a man ought to have in his pocket ready for stock in September or October, for every acre he designs to stall-feed. And it also shews, that the man who would carry on this part of his business to advantage, must stock his farm in a very different manner from what is common.

If he is upon good land—better than the average of mine, and manures well, his crops may be supposed as above to amount to 35 tons; then he must stock at the rate of 20 $\frac{1}{2}$  an acre; and in whatever variations of produce he finds his crops to be arranged, the proportion of 11s. 9d. *per* ton remains the same. But supposing 15 $\frac{1}{2}$  *per* acre the sum, how few farmers ever think of providing in such a stile! Suppose a farm to consist of 120 arable acres thrown into the course of, 1. turneps; 2. barley; 3. clover; 4. wheat; 30 acres of each: suppose 5 acres necessary for the sheep, &c. then 25 is to be stocked, and come at 15 $\frac{1}{2}$  *per* acre to 375 $\frac{1}{2}$ . Now upon a moderate calculation, that sum is to the full as much as most farmers would apply to the whole stock of their farms, how then is it possible they should cultivate turneps to profit without possessing one twentieth of the sums that are requisite for the purpose.

The want of money in this part of the business is attended with very fatal consequences. For what is the conduct the farmer must pursue in that case? He must either summer-fallow the 25 acres, which upon turnep land would be counter to all ideas of profit, and make the business an hundred *per cent.* less advantageous: Or, in the other case, he must sow corn, instead of turneps, taking a crop of pease, tares, &c. and following some. If he pursues the first course, which is most probable the want of turneps strikes out the use of clover; for he will sow wheat on his fallow, and after that barley, or oats, or pease: a course of husbandry, which five centuries ago might have been thought excellent but, at present, is undoubtedly execrable. If very accurate calculation were made of the profit of such a system, and also of that which includ-

turneps and clover, I have little doubt but it would prove, one method upon 50 acres would exceed the other on 200. Of such great consequence is it to a farmer to have money enough in his pocket to apply his crops to the best uses.—But here I should remark, that in these observations I by no means include those tracts of country which possess the great advantage of neighbours, who will never fail of purchasing all the turneps raised to feed them off with sheep. In such places the turnep culture may be carried on to great profit without any extra sum of stock.

## S E C T I O N II

## CULTURE and PRODUCE in the New Method.

THE writers who have attached themselves particularly to the drill culture, have been very diffuse in their praise of it for raising turneps. — They assert, that whatever doubts may be entertained of it for the culture of corn, yet respecting turneps the point is too clear to admit the least dispute: I have found them in this opinion come much nearer the mark than in their praises of drilled corn: but on my soil some experiments have not succeeded in the manner I had reason to expect, from the ample promises made by these gentlemen.

Before I proceed to insert my trials, I must remark to the reader, that this whole section is drawn up quite differently from its appearance in my rough paper. Most of the experiments were too small for a distinct expenditure of the products of each; I had therefore valued the crops with the assistance of my bailey: but on the conclusion of the preceding section it struck me, that the way to render them at all decisive, would be to substitute the value *per* ton discovered by those trials, instead of such valuations, retaining every other circumstance: and I have accordingly formed new registers of them all, and new written the observations subjoined; so as I flatter myself they will be more accurate than in the former state, and, consequently, more useful.

EXPERIMENT N<sup>o</sup> 1.

Culture, expences, and produce, of half a rood, field M<sup>o</sup>, 1764.

## CULTURE.

The tillage of this piece began in November 1763, when it was first ploughed. In March gave it another earth; and harrowed it once. In April stirred it twice more, and harrowed it twice: In the middle of May

[N 2]

ploughed



ploughed it on to five-foot ridges; and the latter end of the same month harrowed them again. The 10th of June arched up the ridges by another ploughing: and harrowing them fine, drilled one row of turnep seed on the top of each. The plants came up very favourably; but so thick that they were forced to be thinned by hand; which was done to the distance of about 1 foot from plant to plant: when the leaves extended about 5 inches they were hand-hoed carefully: the middle of July gave the first horse-hoeing with the common plough, by turning a furrow from the plants, and throwing up a small ridge in the middle of each interval. The last week of that month hand-hoed the plants again; cleaning them very carefully from all weeds, and leaving them every where distinct. In August two more horse-hoeings were given: the first threw the mould towards the rows, and the second brought it back again. And the middle of September the fourth and last operation of this sort; returned the earth to the rows, and left the ridges in their first position. The turneps flourish'd very finely; were in general large, and made a beautiful appearance from the regularity of the rows. The beginning of January I cut off the tops and tap-roots of one row (the piece contained four) and weighed them: the weight 3 cwt. 0 qrs. 14 lb. which is 5 tons *per acre*, a crop that amazed me: from the idea I had formed from books, I was led fully to expect a crop at least equal to any broad-cast one, whereas I had common ones adjoining four or five times as good. Five tons are a paltry crop. The effect of the culture I take to be very advantageous: for the size of the turneps exceeded at a medium my broad-cast crops. Proportions *per acre*

EXPENCES.						£.	s.	d.
Six ploughings,	—	—	—	—	—	0	6	0
Six harrowings,	—	—	—	—	—	0	0	9
Drilling,	—	—	—	—	—	0	0	4½
Seed,	—	—	—	—	—	0	0	3
Hand-hoeing twice,	—	—	—	—	—	0	2	6
Four-horse-hoeings,	—	—	—	—	—	0	4	0
Drawing and carting, at 3d. a ton,	—	—	—	—	—	0	1	3
						0	15	1½
Rent, &c.	—	—	—	—	—	0	17	0
						1	12	1½
PRODUCE.						£.	s.	d.
Five tons at 2s. 4½d. the average of the carted crops in						} 0 11 10½		
Sect. I.								
Expences,	—	—	—	—	—	1	12	1½
Produce,	—	—	—	—	—	0	11	10½
						<hr/>		
Loss, carried over,	—	—	—	—	—	1	0	3



of the general superiority proves plainly the contrary. The drills have an advantage in the equality of the size; but that advantage weighs nothing with those in the opposite scale.

Had I reasoned alone upon the subject, I should readily have conceived, that so wide a distance as five feet, from row to row, and that space kept so well cultivated, for the roots of the turneps to spread in, would have made them vastly larger than any in the common method: but nothing so deceitful as reason in these matters. There is certainly such an effect; but the extent of that effect bears no proportion to opposite circumstances.

The culture bestowed on these rows much exceeded what is given to common crops; for the whole land was, literally speaking, like a garden, not a single weed to be seen, and the earth most thoroughly pulverized. The effect of this on the next crop must certainly be great, equal at least to the best of summer fallows. In this light the drill culture, on comparison with the husbandry of former times, must appear to great advantage; for the old plan of fallowing is carried on with a small crop on the ground, that will pay something towards the expence of the fallow.

#### EXPERIMENT N<sup>o</sup> 2.

Culture, expences, and produce, of half a good, field M\*, 1764.

#### CULTURE.

Gave the first ploughing in October, turning in three loads of common farm-yard-dung. In February ploughed it again: in March twice more, and harrowed it. The middle of April gave it the fifth earth, and harrowed it again. Repeated these operations in May. The first week in June ploughed it on to five-foot ridges, and harrowed them: the week following manured the crowns of them with eight bushels of malt dust, and ploughed it in by arching up the ridges. Immediately harrowed and drilled them; a single row of turnep-seed on the top of each. They came up very finely; but so thick, that, at the first hoeing, the men were forced to strike their hoes through the rows, cutting the plants totally up to the breadth of the hoes, and leaving them standing in little clusters, which they then thinned by hand; so that the crop stood one foot from plant to plant. The middle of July I gave the first horse-hoeing, going a bout in each interval; taking a slice from the ridges, and throwing up a small ridge in the middle of the intervals. The first week in August gave them another hand-hoeing, very carefully extirpating every weed, and cutting up the turneps that were accidentally left double before: also horse-hoed them again contrary to the manner of the last. In September two more horse-hoeings were given; the last of which left

the ridges in their first position. This crop made throughout the season a very beautiful appearance; the leaves were always of a fine verdure, spread a great way, and the apples of a large size, and uncommonly regular. The beginning of January I weighed a fifth of it, which was one row chosen for the medium. It amounted to 6 cwt. which is at the rate of 12 tons *per* acre. I weighed several of the turneps separately that came to 17 lb. Such fine plants on regular ridges, without a weed to be seen, carried an appearance that was remarkably agreeable. Proportions per acre.

EXPENSES.					£.	s.	d.
Eight ploughings,	—	—	—	—	0	8	0
Six harrowings,	—	—	—	—	0	0	9
Manuring the first,	—	—	—	—	0	5	0
Ditto the second,			—	—	1	9	0
Drilling,	—	—	—	—	0	0	4 $\frac{1}{2}$
Seed,	—	—	—	—	0	0	3
Hand-hoeing twice,	—	—	—	—	0	3	0
Four horse-hoeings,	—	—	—	—	0	4	0
Drawing and carting,		—	—	—	0	3	0
					2	13	4 $\frac{1}{2}$
Rent, &c.	—	—	—	—	0	17	0
					3	10	4 $\frac{1}{2}$

PRODUCE.					£.	s.	d.
12 tons, at 2s. 4 $\frac{1}{2}$ d.	—	—	—	—	1	8	6
Expences,	—	—	—	—	3	10	4 $\frac{1}{2}$
Produce,	—	—	—	—	1	8	6
Loss	—	—	—	—	2	1	10 $\frac{1}{2}$
Ploughing.	—	—	—	0	8	0	
Harrowing,	—	—	—	0	1	1 $\frac{1}{2}$	
Manuring,	—	—	—	0	9	10	
Drilling,	—	—	—	0	0	2	
Horse-hoeing,	—	—	—	0	2	8	
Carting,	—	—	—	0	4	6	
					1	6	3 $\frac{1}{2}$
Total loss,	—	—	—	—	3	8	2

## OBSERVATIONS.

The fine appearance of this crop gave me great hope of finding it profitable, exclusive of the manuring; but the contrary is the case: if all the expence of manure is deducted, still it is a losing crop. This must be owing to so small a part of the land being occupied by the plants; for the turneps themselves were on this piece much larger upon an average than I remember to have seen in any broad-cast crop; so that the inferiority of produce in this method can be owing to no other cause than the whole surface not being covered. I believe there are many broad-cast crops that do not exceed 12 tons *per* acre; but none that were managed in any manner comparable to this: 3*l.* 8*s.* 2*d.* loss *per* acre is very heavy; so much so, that it must be an extraordinary following crop to repay it with profit.—The turneps in this culture being such fine ones, singly taken, gives one great reason to think the principles of the husbandry good; but counteracted, by an improper exertion of them, the operations of horse-hoeing must certainly exceed those of hand-hoeing alone. But why cannot they be executed in much narrower spaces than five feet? Mr. Tull, it is true, recommends six feet, and perhaps his plants might therefore be yet larger; but I am confident his crop must be the smaller. But from the little experience I have had in horse-hoeing, I should conceive it as well executed on four feet ridges as on five, and, perhaps, as well on three; but of this I am not so clear, as turneps, when they are situated on a ridge, extend their leaves on each side far into the furrows. It is, however, extremely well worth the trial, and I shall accordingly form my next year's experiments under several variations.

EXPERIMENT N<sup>o</sup> 3.

Culture, expences, and produce, of a rood, field G\*, 1765.

## CULTURE.

I formed various trials of drilled turneps this year; but most of them failed, through the extreme unfavourableness of the season. In such a case the expences ought not to be charged to turneps, except the mere seed and drilling, as all the tillage is ready for another crop. The drought of this year has reduced the number of my intended trials greatly. This piece was first ploughed in autumn, and again in February. Another earth and an harrowing were given in March. In April the fourth ploughing was given. In May it received the fifth, and two more harrowings. The first week in June threw it on to four-foot ridges, manuring it at the same time with four loads of rotten farm-yard dung: drilled a single row of turneps on the top of each. They came up tolerably well, but were briskly attacked by the fly; so that I much feared they would be totally destroyed. This induced me to manure the rows, by strewing coal-ashes on them by hand: in a dewy evening

I used six bushels. The experiment succeeded, and the turneps escaped. The fly I apprehend would not settle on the ashes; for where they happened to fall rather thicker than ordinary, the attack immediately ceased, and all along the rows a sufficiency of plants was left for a full crop. They came on very favourably, and were hand-hoed as soon as large enough to stand the hoe. In July horse-hoed them twice, in the same manner as before minuted for the five-foot ridges. In August another hand-hoeing was given, and one more horse-hoeing; which latter operation was repeated the beginning of September, and which left the ridges in their first form. The beginning of January I took up one row, a fourth of the piece, and weighing it, (the tops and roots cut off) they amounted to 11 cwt. 1 qr. or *per acre* nine tons; which is a crop of some value in so bad a season, but not comparable to any broad-cast ones that escaped equally well.

## EXPENCES.

					£.	s.	d.
Six ploughings,	—	—	—	—	0	6	0
Five harrowings,	—	—	—	—	0	0	7½
Manuring,	—	—	—	—	0	3	6
Ditto ashes,	—	—	—	—	0	1	8
Seed and drilling,	—	—	—	—	0	0	7
Two hand-hoeings,	—	—	—	—	0	2	0
Four horse-hoeings,	—	—	—	—	0	3	0
Drawing and carting,	—	—	—	—	0	2	3
					0	19	9½
Rent, &c.	—	—	—	—	0	17	0
					1	16	9½

## PRODUCE.

					£.	s.	d.
9 tons, at 2s. 4½d.	—	—	—	—	1	1	4½
Expences,	—	—	—	—	1	16	9½
Produce,	—	—	—	—	1	1	4½
Loss,	—	—	—	—	0	15	5
Ploughing,	—	—	—	0	14	4½	
Harrowing,	—	—	—	0	1	10½	
Manuring,	—	—	—	0	7	0	
Drilling,	—	—	—	0	0	3½	
Horse-hoeing,	—	—	—	0	4	10	
Carting,	—	—	—	0	5	8	
					1	14	0½
Total loss,	—	—	—	—	2	9	5½

## OBSERVATIONS.

It is somewhat strange that this practice of drilling should prove so extremely unprofitable in trials wherein it manifestly succeeded; for the plants live and thrive finely, and come even to a larger size than those in the common method; and yet the products gross *per acre* and the profit are far inferior to the common crops. It must, I think, be owing to the quantity of land unoccupied with plants: — to what other cause to attribute it I know not. Had not several of my experiments failed this year, I should have been able to decide the matter accurately; for I had tried various breadths of interval. — A loss of 49s. an acre, by a crop that ought, at least, to pay its own expenses, if unmanured, and nearly do it when manured, is unprofitable to such a degree, that, unless variations are discovered more suitable, it must be banished from practice. Sorry I am, that the unfavourableness of this season would not allow me to try that which I must now postpone to next year.

EXPERIMENT N<sup>o</sup> 4.

Culture, expences, and produce, of a rood, field G<sup>o</sup>, 1765.

## CULTURE.

I marked this rood for the trial of the complete exertion of both tillage and manure. The beginning of October 1764, it was ploughed to the depth of 10 inches by four horses. The beginning of November I spread on it five loads of rotten farm-yard dung, and turned it in by a common ploughing. In March stirred it again: in April twice more, and harrowed it thrice. Many weeds were turned in by the sixth earth given the middle of May. The first week in June threw it on to four-foot ridges, and in a few days after manured them with a compost, consisting of malt-dust, soot and mortar rubbish, of each 10 bushels. Turned in this manuring by arching up the ridges; and upon each, the middle of June, drilled a single row of turneps. They came up extremely well, and were presently out of all danger from the fly, notwithstanding the extreme unfavourableness of the season. The middle of July horse-hoed them, turning a furrow from the plants on each side, leaving them on a slip of land, about nine inches wide: hand-hoed that slip directly, setting the plants to the distance of about 12 inches. In August gave two more horse-hoeings, and another hand-hoeing; and the first week in September the last horse-hoeing, which threw the earth back to the ridges, and left them in their first form. The turneps made an excellent appearance throughout the season, were very large, and more equal in size than any common crops. The middle of January I weighed a row that was as  
near

near as possible the average of the crop: the amount was 15 cwt. within a few pounds; and as there were five rows in the rood, it is *per* acre 15 tons. I weighed one turnep that was 22 lb. an extraordinary size.

EXPENCES.					£.	s.	d.
Trench ploughings,	—	—	—	—	0	2	0
Seven ploughings,	—	—	—	—	0	7	0
First manuring,	—	—	—	—	0	5	3
Second ditto,	—	—	—	—	0	9	7
Six harrowings,	—	—	—	—	0	0	9
Drilling,	—	—	—	—	0	0	4½
Seed,	—	—	—	—	0	0	3
Two hand-hoeings,	—	—	—	—	0	3	0
Four horse-hoeings,	—	—	—	—	0	3	0
Drawing and carting,	—	—	—	—	0	3	9
					1	14	11½
Rent, &c.	—	—	—	—	0	17	0
					2	11	11½

PRODUCE.					£.	s.	d.
15 tons, at 2s. 4½d.	—	—	—	—	1	15	7½
Expences,	—	—	—	—	2	11	11½
Produce,	—	—	—	—	1	15	7½
Loss,	—	—	—	—	0	16	4
Ploughing,	—	—	—	1	1	2½	
Harrowing,	—	—	—	0	2	3	
Manuring,	—	—	—	0	6	3	
Ditto,	—	—	—	0	3	0	
Drilling,	—	—	—	0	0	3½	
Horse-hoeing,	—	—	—	0	4	10	
Carting,	—	—	—	0	9	4	
					2	7	2½
Total loss,	—	—	—	—	3	3	6½

## O B S E R V A T I O N S.

This crop, in point of weight, is considerable for four-foot ridges, with single rows; and, I think, proves two circumstances; one *for*, and the other *against* drilling. Supposing *all* the land to yield as well as the crowns of



of the ridges, and to be as thickly planted as broad-cast crops, the amount would be above 50 tons *per* acre, which is a much greater produce than this land would have yielded in the common method. This is a proof that the operations of horse-hoeing, &c. advance the growth of the turneps more than the common tillage does the broad-cast ones. And on the other hand, it is equally certain, that such advantages do not, in any respect, equal the produce of the broad-cast crops; from the circumstance of the ground not being sufficiently covered with plants. Whatever Mr. Tull may have asserted, and with whatever confidence his rigid adherents may insist on the propriety of his directions, yet I will venture to contradict his facts upon the solid foundation of experience. It is in vain to talk of diversity of soils; no variations can extend to such an inconceivable degree, as to convert an absolute negative into an affirmative. I would bet a broad-cast acre, under a perfect similarity of soil and culture, against a drilled one, whose rows were four or more feet asunder: and at the same time that I made this assertion, I would, on the other hand, allow, that the turneps in the rows would prove much larger than the broad-cast, plant against plant; but for gaining a great crop, all the land must be covered with plants. The loss of three guineas *per* acre is so heavy an expence, that the advantage of the land being brought into such fine order is probably purchased at double the price it is worth: at least the expence is too great for any husbandman to submit to it, while other methods not only remain to be tried, but are in common practice.

#### EXPERIMENT N<sup>o</sup> 5.

Culture, expences, and produce, of a rood, field M\*, 1766.

#### CULTURE.

This piece received its first tillage in October 1765; the beginning of which month it was ploughed with four horses to as great a depth as we could get, about 10 inches. The last week of the same month manured it with four loads of compost, consisting of farm-yard dung, town-dung, coal-ashes, mortar-rubbish, ditch-earth, and mole-hills, &c. that had been well mixed together; turned it in by a common ploughing. In March gave the first spring ploughing; and another earth in April. In May stirred it again, and harrowed it twice: the beginning of June ploughed it on to common three-feet ridges. The second week reversed those ridges, turning in 10 bushels of malt dust, and drilled a single row of turneps along the top of each. They came up very well, received no attacks from the fly, and were hand-hoed as soon as large enough. The 14th of July gave the first horse-hoeing, turning a narrow furrow from the rows on each side; which, in Suffolk,

is called drawing the ridges into *barks*, or *haulks*, I suppose. Some days after this operation, I hand-hoed them a second time, cutting the slip of earth well whereon the plants stood, and thinning them wherever they had been left too thick. The first week in August threw back the moulds by a second horse-hoeing, and repeated the operation before the end of the month, reversing the last. The beginning of September gave a fourth horse-hoeing, which left the ridges in their first form. The latter end of the same month, I drew my double mould-board plough through each interval, which struck the furrow clean, throwing all the loose moulds against the rows, and banking the ridges. All these operations not only brought the crop on in a very fine manner, but made the land as clean, and in as perfect a state of pulverization, as any garden. The middle of January I took up one row, the fourth of the rood, which was on an equality with the rest; and cutting off the tops and tap-roots, and cleaning them, the weight was 2 tons, 3 cwt. 3 qrs. which is *per acre* 35 tons: a very considerable crop, larger than I ever expected to raise in the drill husbandry. The turneps were of a fine size, and very equal; in both respects exceeding my broad-cast crops on an average.

EXPENCES.					£.	s.
Trench-ploughing,	—	—	—	—	0	2 0
Six ploughings,	—	—	—	—	0	6 0
Manuring, at 20d. <i>per</i> load, (being the expence of that compost)	—	—	—	—	1	6 8
Three harrowings,	—	—	—	—	0	0 4½
Second manuring,	—	—	—	—	0	18 0
Drilling	—	—	—	—	0	0 6
Seed,	—	—	—	—	0	0 3
Two hand-hoeings,	—	—	—	—	0	4 6
Five horse-hoeings,	—	—	—	—	0	4 6
Drawing and carting,	—	—	—	—	0	8 9
					3	11 6½
Rent, &c.	—	—	—	—	0	17 0
					4	8 6½

PRODUCE.					£.	s.	d.
35 tons, at 2s. 4½d.	—	—	—	—	4	3	1½
Loss,	—	—	—	—	0	5	5

Ploughing,

				£.	s.	d.	£.	s.	d.
Ploughing,	—	—	—	0	19	6			
Harrowing,	—	—	—	0	1	1½			
Manuring,	—	—	—	0	5	0.			
Ditto,	—	—	—	0	5	6			
Drilling,	—	—	—	0	0	5			
Horfe-hoeing,	—	—	—	0	7	3½			
Carting,	—	—	—	1	2	1			
							3		
Total loss,	—	—	—				3	6	4½

## O B S E R V A T I O N S.

The heavy expences of the culture, including a double manuring, will not allow the possibility of profit; but that, in such cases, is not to be expected. When a crop is prepared for at an uncommon expence, and a foundation thereby laid for many succeeding advantages during the course, the balance of the account must not be too critically examined: although in this case of turneps, if a good crop is gained, the loss, even at first, will not be so great as may be imagined: 35 tons may fairly be supposed in stall-feeding (and the expence of carting the turneps for that purpose is charged) to yield 20 loads of dung; sufficient amply to manure one acre: the value will not be short of the balance of this account, every thing included; which leaves the fallow year even; neither profit nor loss. But if a summer fallow be substituted, the rent will be 17s. and to bring the land into as good order as this crop of turneps leaves it, eight ploughings will be necessary, which are 1l. 7s. 6d. in all 2l. 4s. 6d. and after all, the land undoubtedly will not yield near the crop of the turnep-land manured with 20 loads an acre: but supposing the crops equal, and that the dung is worth but 1l. 1s. 10d. even in that case, the two accounts are upon a par; but both these suppositions are equally extravagant. From this comparison we find, that turnep crops, when good enough to yield plenty of manure in the expenditure, may have a large balance on the wrong side of the account, and yet be very profitable, compared with a common summer fallow. In one case you sow your barley on land twice richly manured for the turneps, and once after them, 20 load an acre, at the expence of something more than 3l. 6s. 4d. per acre. In case you sow without any manuring at all, at the expence of 2l. 4s. 6d. the difference is 1l. 1s. 10d. and the difference of the crops of barley would on this land be, at least, as 5½ quarters to 2½; which, at 16s. is 2l. 8s. 0d. besides the vast difference in the clover and the

the succeeding wheat. It is from hence sufficiently plain, that this drilling is infinitely superior to a common summer fallow.

The product of this trial shews, that Mr. Tull's directions for 6 feet ridges are utterly absurd; by contracting them half, a great crop is gained, and in a manner that shews his principles to be good in a certain degree: the effects of horse-hoeing are here gained in great perfection, which is evident from the size of the turneps so much exceeding the broad-cast ones on an average: and at the same time that these advantages are gained, there are plants enough on the ground, from the narrowness of the intervals, to yield a good crop. Supposing the same manure and tillage, I have no doubt but the broad-cast method would have exceeded even this crop; which superiority would be owing to the greater number of turneps, though smaller in size: this points out a further contraction of the rows; but then you will presently come to a degree of narrowness, which will either exclude the horse-hoe, or render its working mischievous to the plants. — The narrowest ridge our ploughmen can make is a 3 feet one, by carrying thin furrows a few inches less; therefore if narrower intervals are sought, you would be obliged to drill on the level, which at once destroys half the efficacy of the horse-hoeing; for the little surge of moulds carried by the plough against the plants, even when you horse-hoe *from* them, will bury and destroy them; whereas when the plants stand on the crown of a ridge, such moulds fall again into the furrow, and leave the plants free. In the level work also the leaves of the turneps are much in the way both of the horse and plough. I have not experience of turneps on less ridges than 3 feet; but from horse-hoeing such crops, and other sorts, with narrow intervals, I am confident the effect can be of no consequence; that the crops would in fact be broad-cast ones, with a few moulds here and there, scratched up from a greater depth than the hand-hoe cuts; and even that effect not gained without an opposing loss in the damage done by the horse and plough. But in this observation I confine myself to the operations of my own instruments; others may possess peculiar ones that are adapted to different work: I have an horse-hoe, the hint of which I took from M. de Chateauxvieux's Single Cultivator; it works under-ground, and requires not more than the space of 12 inches. I have worked it in 18 inch partitions, but never without the horse doing much mischief; nor did I ever perceive any benefit result from the operation.

#### EXPERIMENT N<sup>o</sup> 6.

Culture, expences, and produce, of an acre and half, in six divisions, field F\*, 1766.

#### CULTURE.

The tillage of this piece began in October 1765, when it was first ploughed and water-furrowed. In March gave it the second earth; in April the

the third: in May both ploughed and harrowed it. The beginning of June, by the fifth stirring, threw it into various ridges, and harrowed them.

N<sup>o</sup> 1, Common three feet ones.

2, Four feet over.

3, Five feet over.

4, Four feet.

5, Five feet.

6, Five feet.

The 25th arched up all except N<sup>o</sup> 4, which was reversed. Harrowed them again, and immediately drilled them as follows:

One row on N<sup>o</sup> 1.

One row on N<sup>o</sup> 2.

One row on N<sup>o</sup> 3.

Two rows on N<sup>o</sup> 4, 1 foot asunder.

Two rows on N<sup>o</sup> 5, ditto.

Three rows on N<sup>o</sup> 6.

Fortunately they all came up extremely well, and escaped the fly. The middle of July hand-hoed them all at the same time; leaving the plants as exactly as possible within 1 foot of each other in the rows. In a few days after horse-hoed them all for the first time, turning a furrow on each side from the rows, which necessarily threw up a small ridge in the middle of each interval. The beginning of August hand-hoed them again, leaving the slip of ground whereon the rows stood quite free from weeds, in perfect tilth, and the plants every where single. In August gave two more horse-hoeings, each reversing the last; and also another hand-hoeing to the double rows, which not being quite so well hoed as the single ones, shewed some signs of wanting it. The first week in September concluded the operations by giving the last horse-hoeing, which returned the moulds of the last, and left the ridges in their first form. All the pieces carried a very good countenance; but the single rows were, in verdure, something superior to the others.

In January I weighed the crops, the tops, tap-roots, and dirt clean off, and equally from all: a row of each fairly chosen as the medium of each piece.

		T. C. 2.		
N <sup>o</sup> 1.	One row, being the sixth of the rood, 8 cwt. 3 qrs.	}	10	10 0
or per acre,	— — — — —			
N <sup>o</sup> 2.	One row, being the fifth of the rood, 9 cwt. 3 qrs.	}	9	15 0
or per acre,	— — — — —			
		N <sup>o</sup> 3.		

	T. C. 2.
N <sup>o</sup> 3. One row, being the fourth of the rood, 9 cwt. 1 qr. } or <i>per</i> acre, — — — — — }	7 11 0
N <sup>o</sup> 4. One ridge, being the fifth of the rood, containing two } rows, 13 cwt. 1 qr. or <i>per</i> acre, — — — — — }	13 5 0
N <sup>o</sup> 5. One ridge, being the fourth of the rood, containing } two rows, 15 cwt. or <i>per</i> acre, — — — — — }	12 0 0
N <sup>o</sup> 6. One ridge, being the fourth of the rood, containing } three rows, 18 cwt. 3 qrs. or <i>per</i> acre, — — — — — }	15 2 1
Product <i>per</i> acre of treble rows on five-feet ridges, — — — — —	15 2 1
Ditto of double rows on four-feet ridges, — — — — —	13 5 0
Superiority of the former, — — — — —	1 17 1
Product of treble rows on five-feet ridges, — — — — —	15 2 1
Ditto of double rows on five-feet ridges, — — — — —	12 0 0
Superiority of the former, — — — — —	3 2 1
Product of treble rows on five-feet ridges, — — — — —	15 2 1
Ditto of single rows at three feet, — — — — —	10 10 0
Superiority of the former, — — — — —	4 12 1
Product of the treble rows on five-feet ridges, — — — — —	15 2 1
Ditto of single rows on four-feet ridges, — — — — —	9 15 0
Superiority of the former, — — — — —	5 7 1
Product of treble rows on five-feet ridges, — — — — —	15 2 1
Ditto of single rows on five-feet ridges, — — — — —	7 11 0
Former superiority, — — — — —	7 11 1
Product of double rows on four-feet ridges, — — — — —	13 5 0
Ditto of double rows on five-feet ridges, — — — — —	12 0 0
Former superiority, — — — — —	1 5 0
Product of double rows on four-feet ridges, — — — — —	13 5 0
Ditto of single rows at three feet, — — — — —	10 10 0
Former superiority, — — — — —	2 15 0
Product of double rows on four-feet ridges, — — — — —	13 5 0
Ditto of single rows on four-feet ridges, — — — — —	9 15 0
Former superiority, — — — — —	3 10 0

T. C. 2.

Product of double rows on four-feet ridges,	—	—	—	13 5 0
Ditto single on five-feet ridges,	—	—	—	7 11 0
Former superiority,	—	—	—	5 14 0
Product of double rows on five-feet ridges,	—	—	—	12 0 0
Ditto of single rows on three-feet ridges,	—	—	—	10 10 0
Former superiority,	—	—	—	1 10 0
Product of double rows on five-feet ridges,	—	—	—	12 0 0
Ditto of single rows on four-feet ridges,	—	—	—	9 15 0
Former superiority,	—	—	—	2 5 0
Product of double rows on five-feet ridges,	—	—	—	12 0 0
Ditto of single rows on five-feet ridges,	—	—	—	7 11 0
Former superiority,	—	—	—	4 9 0
Product of single rows on three-feet ridges,	—	—	—	10 10 0
Ditto of single rows on four-feet ridges,	—	—	—	9 15 0
Former superiority,	—	—	—	0 15 0
Product of single rows on three-feet ridges,	—	—	—	10 10 0
Ditto of single rows on five-feet ridges,	—	—	—	7 11 0
Former superiority,	—	—	—	2 19 0
Product of single rows on four-feet ridges,	—	—	—	9 15 0
Ditto of ditto, five-feet ridges,	—	—	—	7 11 0
Former superiority,	—	—	—	2 4 0

Proportions *per* acre as follow.

ACCOUNT of N° 1.

EXPENCES.				£.	s.	d.
Six ploughings,	—	—	—	0	6	0
Four harrowings,	—	—	—	0	0	6
Water-furrowing,	—	—	—	0	0	3
Drilling, .	—	—	—	0	0	6
Seed,	—	—	—	0	0	4
Carried over,	—	—	—	0	7	7

						£.	s.	d.
Brought over,	—	—	—	—	—	0	7	7
Two hand-hoeings,	—	—	—	—	—	0	2	6
Four horse-hoeings,	—	—	—	—	—	0	4	0
Drawing and carting,	—	—	—	—	—	0	2	7½
						0	16	8½
Rent, &c.	—	—	—	—	—	0	17	0
						1	13	8½

## P R O D U C E.

						£.	s.	d.
10½ tons, at 2s. 4½d.	—	—	—	—	—	1	4	11½
Expenses,	—	—	—	—	—	1	13	8½
Produce,	—	—	—	—	—	1	4	11½
						0	8	9½
Loss,	—	—	—	—	—			
Ploughing,	—	—	—	—	0	14	7½	
Harrowing,	—	—	—	—	0	1	6	
Drilling,	—	—	—	—	0	0	5	
Horse-hoeing,	—	—	—	—	0	6	6	
Carting,	—	—	—	—	0	6	6½	
						1	9	7½
Total loss,	—	—	—	—	—	1	18	4½

A C C O U N T of N<sup>o</sup> 2.

## E X P E N C E S.

						£.	s.	d.
Six ploughings,	—	—	—	—	—	0	6	0
Four harrowings,	—	—	—	—	—	0	0	6
Water-furrowing,	—	—	—	—	—	0	0	3
Drilling,	—	—	—	—	—	0	0	4½
Seed,	—	—	—	—	—	0	0	3½
Two hand-hoeings,	—	—	—	—	—	0	2	0
Four horse-hoeings,	—	—	—	—	—	0	3	0
Drawing and carting,	—	—	—	—	—	0	2	5½
						0	14	10½
Rent, &c.	—	—	—	—	—	0	17	0
						1	11	10½



## PRODUCE.

9 ½ tons, at 2s. 4½d.

Expences,  
Produce,Loss,  
Ploughing,  
Harrowing,  
Drilling,  
Horse-hoeing,  
Carting,

Total loss,

£. s. d.

1 3 1½

1 11 10½

1 3 1½

0 8 8½

0 14 7½

0 1 6

0 0 3½

0 4 10

0 6 1

1 7 4½

1 5 0½

ACCOUNT OF N<sup>o</sup> 3.

## EXPENCES.

Six ploughings,  
Four harrowings,  
Water-furrowing,  
Drilling  
Seed,  
Two hand-hoeings,  
Four horse-hoeings,  
Drawing and carting,

Rent,

£. s. d.

0 6 0

0 0 6

0 0 3

0 0 3½

0 0 3

0 1 6

0 2 8

0 1 10½

0 13 4

0 17 0

1 10 4

## PRODUCE.

7 tons, 11 cwt. at 2s. 4½d.

Expences,  
Produce,

Carried over, Loss,

£. s. d.

0 17 11

1 10 4

0 17 11

0 12 5

					£.	s.	d.
Brought over, Loss,	—	—	—	—	—	0	12 5
Ploughing,	—	—	—	—	0	14	7½
Harrowing,	—	—	—	—	0	1	6
Drilling,	—	—	—	—	0	0	3
Horse-hoeing,	—	—	—	—	0	4.	0
Carting,	—	—	—	—	0	4	8½
					<hr/>		
					1 5 1		
Total loss,	—	—	—	—	—	<hr/>	
					1 17 6		

ACCOUNT of N<sup>o</sup> 4.

## EXPENCES.

EXPENCES.							£.	s.	d.
Six ploughings,	—	—	—	—	—	—	0	6	0
Four harrowings,	—	—	—	—	—	—	0	0	6
Water-furrowing,	—	—	—	—	—	—	0	0	3
Drilling,	—	—	—	—	—	—	0	0	4½
Seed,	—	—	—	—	—	—	0	0	7
Three hand-hoeings,	—	—	—	—	—	—	0	6	6
Four horse-hoeings,	—	—	—	—	—	—	0	3	0
Drawing and carting,	—	—	—	—	—	—	0	3	3½
							1	0	6½
Rent,	—	—	—	—	—	—	0	17	0
							1	17	6½

## PRODUCE.

				PRODUCE.				£. s. d.					
13 Tons, at 2s. 4½d.	—	—	—	—	—	—	—	1	11	5½			
Expences,	—	—	—	—	—	—	—	1	17	6½			
Produce,	—	—	—	—	—	—	—	1	11	5½			
<hr/>													
Loss,	—	—	—	—	—	—	—	0	6	0½			
Ploughing,	—	—	—	—	—	—	0	14	7½				
Harrowing,	—	—	—	—	—	—	0	1	6				
Drilling,	—	—	—	—	—	—	0	0	3½				
Horse-hoeing,	—	—	—	—	—	—	0	4	10				
Carting,	—	—	—	—	—	—	0	4	1				
								<hr/>					
								1				5	4½
<hr/>													
Total loss,	—	—	—	—	—	—	—	1	11	5			

ACCOUNT of N<sup>o</sup> 5.

## EXPENCES.

					£.	s.	d.
Six ploughings,	—	—	—	—	0	6	0
Four harrowings,	—	—	—	—	9	0	6
Water-furrowing,	—	—	—	—	0	0	3
Drilling,	—	—	—	—	0	0	3½
Seed,	—	—	—	—	0	0	6
Three hand-hoeings,	—	—	—	—	0	6	0
Four horse-hoeings,	—	—	—	—	0	2	8
Drawing and carting,	—	—	—	—	0	3	—
					0	19	2½
Rent,	—	—	—	—	1	17	0
					1	16	2½

## PRODUCE.

					£.	s.	d.
12 tons, at 2s. 4½d.	—	—	—	—	1	8	6
Expences,	—	—	—	—	1	16	2½
Produce,	—	—	—	—	1	8	6
Loss,	—	—	—	—	0	7	8½
Ploughing,	—	—	—	14	7½		
Harrowing,	—	—	—	1	6		
Drilling,	—	—	—	0	3		
Horse-hoeing,	—	—	—	4	0		
Carting,	—	—	—	3	9		
					1	4	1½
TOTAL LOSS,	—	—	—	—	1	11	10

ACCOUNT of N<sup>o</sup> 6.

## EXPENCES.

					£.	s.	d.
Ploughing,	—	—	—	—	0	6	0
Four harrowings,	—	—	—	—	0	0	6
Water-furrowing,	—	—	—	—	0	0	3
Drilling,	—	—	—	—	0	0	3½
Seed,	—	—	—	—	0	0	9
Carried over,							

					£.	s.	d.
Brought over,	—	—	—	—	0	7	9½
Three hand-hoings,	—	—	—	—	0	7	6
Four horse-hoings,	—	—	—	—	0	2	8
Drawing and carting,	—	—	—	—	0	3	10½
					1	1	10
Rent, &c.	—	—	—	—	0	17	0
					1	18	10½

## PRODUCE.

					£.	s.	d.
15 ½ tons, at 2s. 4½d.	—	—	—	—	1	14	5½
Expense	—	—	—	—	1	18	10
Produce,	—	—	—	—	1	14	5½
Loss,	—	—	—	—	0	4	4½
Ploughing,	—	—	—	0 14	7½		
Harrowing,	—	—	—	0 1	6		
Drilling,	—	—	—	0 0	3		
Horse-hoeing,	—	—	—	0 4	0		
Carting,	—	—	—	0 4	9½		
					1	5	2½
Total loss,	—	—	—	—	1	9	7

## RECAPITULATION.

			£.	s.	d.
Loss by double rows on five-foot ridges,	—	—	1	11	10
Ditto by treble rows on five-foot ridges,	—	—	1	9	7
Ditto by double rows on four-foot ridges,	—	—	1	11	5
Ditto by single rows on four-foot ridges,	—	—	1	16	0½
Ditto by single rows on five-foot ridges,	—	—	1	17	6
Ditto by single rows three feet asunder,	—	—	1	18	4½

## OBSERVATIONS.

From this table it appears very evidently, that when the variations of weight of crops are not great, they ought not to be taken as a rule for judging of different modes of fowing. Was only the first part of this experiment to be laid before a person, not much accustomed to husbandry, he would at once determine according to the weight alone of the crop; but the

second

second part of the trial would demand an opinion somewhat different. That a clear judgment may be easily formed of both criterions, I shall here insert both circumstances in one view.

<i>Rows.</i>		<i>Weight.</i>			<i>Loss.</i>		
		<i>T.</i>	<i>C.</i>	<i>Q.</i>	<i>£.</i>	<i>s.</i>	<i>d.</i>
Three on five-feet ridges,	—	15	2	1	1	9	7
Two on four-feet ridges,	—	13	5	0	1	11	5
Two on five-feet ditto	—	12	0	0	1	11	10
One on three-feet ditto,	—	10	10	0	1	18	4½
One on four-feet ditto,	—	9	15	0	1	16	0
One on five-feet ditto,	—	7	11	0	1	17	6

The table may be divided thus:

<i>Rows.</i>			<i>Weight.</i>			<i>Loss.</i>		
			<i>T.</i>	<i>C.</i>	<i>Q.</i>	<i>£.</i>	<i>s.</i>	<i>d.</i>
Double and treble rows, <i>average</i> ,	—	•	13	9	0	1	10	7½
Ditto single,	—	†	9	5	1	1	17	3½

In the first division there is one row, on an average, in every 24 inches of land: in the second it is one row in every 48 inches. This comparison sets the matter in a clear light. Both weight and advantage lie with those crops which are thickest on the ground:—that is, which approach nearest to the broad-cast method; and the great superiority in general of the common crops is a very strong confirmation of this result. The greatest crop is the three rows on five-feet ridges, or one row to 20 inches, which is the smallest space occupied by any: the worst crop is the single row on five-feet ridges, which occupies the largest quantity of land. How consistent this is with Mr. Tull's principles and assertions, I leave the reader to judge. It is, upon the whole, an unfavourable circumstance relative to the drill culture; for it looks very much like the size of the crops depending on the number of the plants to the standard of the broad-cast crops, and not on the culture (beyond hand-hoeing) that is given them. This result is extremely clear from the gradation of these crops: but then we must not carry the idea too far; for those modes of drilling, which advance near the broad-cast, such as three rows on five-feet ridges, being a row in every 20 inches, may easily be conceived to exceed the common method. The variation in number of plants is not great, broad-cast crops being set out from 12 to 18 inches asunder;—and in this way of drilling, they are 18 one

way, by 12' another: so that the difference is by no means considerable; and this small difference may very easily be made up, by the advantages of the horse-hoeing over the hand-work. That such advantages really exist cannot be doubted, from the superior size and equality of the roots. Such advantage may more than balance a *small* inferiority in the number of plants; but is utterly incapable of balancing a *great* inferiority. Respecting other variations of drilling, I shall remark, that if the treble rows on five feet ridges were varied to equally distant at 20 inches, the same number of plants would be on the land; but I apprehend the crop would by no means be larger. On the five feet ridges, the interval for horse-hoeing is three feet, which admits of tillage ten times as effectual as can possibly be given in 20 inches.

The last division of the table into double and treble rows, and into single ones, is extremely satisfactory: the difference in both weight and loss is considerable, and not contradictory at all: the double and treble rows are ~~undoubtedly far more~~ profitable than the single ones. This clear determination is of such extent in the effect, that it can be owing to nothing but the variation of rows; and it should, in consequence, be considered as an object worthy the attention of those who may make drilling their business: for it is an unhappy matter, indeed, if such points are never to be considered as proved, till ten thousand experiments unite in one result.

But in the minuter parts of this experiment, some seeming contradictions occur. The product of 12 tons is attended with a loss of 1*l.* 5*s.* 4*d.* whereas 15  $\frac{1}{2}$  tons give a loss of 1*l.* 9*s.* 7*d.* and by 13  $\frac{1}{2}$  tons, 1*l.* 11*s.* 5*d.* is lost: 9 tons 15 cwt. are more advantageous than 10  $\frac{1}{2}$  tons; and 7  $\frac{1}{2}$  as good, within one shilling, as 10  $\frac{1}{2}$ . These variations are all owing to the expences of the different modes of cultivation; from whence we find, that the weight of the crop is not the point of importance, but the profit or loss.

In the *Culture des Terres*, 6 vols. are registered a great number of experiments, being chiefly comparisons of the old and new husbandry. They are minuted in a very compendious method, under the articles of *culture* and *produce*; but the expences are not inserted.

						lb.
New method,	—	—	—	—	—	8,000
Old ditto,	—	—	—	—	—	5,000
Superiority,	—	—	—	—	—	<u>3,000</u>

Very square and pretty such accounts are! but I will venture to pronounce them not worth a groat. It is the same in comparisons between different modes of drilling, numbers of rows, &c. The products of beds of lucerne, &c. &c. are so minuted in those volumes, and the merit of the methods determined from the number of pounds of produce: but

this single experiment shews, that not *weight*, but the balance of the account in *money* is to be the guide: 100 lb. may easily be more advantageous than 140 lb. &c. Various ridges, rows, &c. vary in all the expences of drilling, seed, horse-hoeing, hand-hoeing, reaping, cutting, &c. &c. consequently the merit of the methods must depend on the general balance of such accounts.

But all such points as these demand a repeated trial for several years: — single experiments are admirable hints; but the averages of many are conviction.

## S E C T. III.

COMPARISON of the Old and New Methods in the CULTURE  
of TURNEPS.

I N various books of husbandry, I have met with comparisons between different methods of culture, drawn up from a variety of *separate* experiments. One field is cultivated in the drill husbandry; another in the broad-cast; and, perhaps, at the time of making the trials in each, with no idea of comparing the one with the other. But after some years are elapsed, the cultivator draws up a comparison between them. In other cases, the culture of a field in one mode is compared with what the culture of such field *would probably have been* in another mode. Such comparisons may be amusing, but they can never be taken as definitive proofs. When two methods are compared, a given spot should be marked out, and divided into as many equal parts as methods to be compared; and these parts should be of no larger size than to admit of all articles of tillage, sowing, &c. &c. to be performed fairly at one and the same time to all the parts. I will not by any means pretend to exalt my own trials on the ruins of those of other cultivators; for I may be in a total mistake throughout the whole matter: however, these are the principles on which I have always formed comparative experiments; and these principles have necessarily occasioned such comparisons to be *in small*; a circumstance which I am well aware will condemn them with some people: but I apprehend such readers are not practical ones. The whole course of my business on some hundreds of acres, as well as an attentive observation of many hundreds besides, have confirmed me in the opinion, that *comparative* experiments in large are of *no* authority.



I should previously remark, that I have new calculated the following experiments in the same manner as those of the preceding section, for the sake of changing uncertain estimates of the crops to the certain value *per* ton of the first section.

### EXPERIMENT N<sup>o</sup> I.

Culture, expences, and produce, of half an acre, in two divisions, field M\*, 1764.

#### CULTURE.

Yielded oats in 1763; the stubble of which was ploughed up in October. In February gave it the first spring earth. In March stirred it again, and harrowed it. In April ploughed it again. Gave the fifth stirring in May, and harrowed it twice. Ploughed it again the middle of June, throwing half on to five feet ridges, and leaving the other half flat. Harrowed in the seed on the last, and drilled a single row on the top of each ridge on the other; both on the same day. The plants came up, and flourished well. Hand-hoed both as soon as large enough; the broad-cast in the common manner, and left them one foot asunder in the rows. The middle of July gave the first horse-hoeing, turning a furrow from the rows on each side, and thereby throwing up a ridge in the middle of each interval: after this operation, hand-hoed the plants again, leaving the slip of earth on which they stood well cut, and the plants all single: at the same time gave the second hand-hoeing to the broad-cast half, which was done in the common manner. In August horse-hoed the rows three times more, each the reverse of the last, alternately turning the earth from and to the plants; and at last leaving the ridges in their first form. Both crops appeared throughout the season to be good ones of their sort; but the drilled turneps were, upon an average, larger than the broad-cast, much more equal in their size, and the colour of their leaves, late in autumn, far beyond that of the other part. The middle of December I marked three square perches, in each part chosen very carefully, to include the best, middling, and worst parts of each. The three perches of the drilled weighed (the tops and tap-roots cut off) 2 cwt. 7 lb. Those of the broad-cast 10 cwt. 2 qrs. The end of January weighed three more, chosen in the same manner. The drilled weighed 2 cwt. 1 qr. The broad-cast 12 cwt.

Tons..

The proportion <i>per</i> acre of the first weighing of the drilled, is	—	5 $\frac{1}{2}$
Ditto of the second,	—	6
Average, 5 tons, 15 cwt.		

				T.	C.	Q.
Proportion <i>per</i> acre of the first weighing of the broad-cast,				28	0	0
Ditto of the second,	—	—	—	30	0	0
Average, 29 tons.						
Broad-cast,	—	—	—	29	0	0
Drilled,	—	—	—	5	15	0
Superiority of the former,	—	—	—	23	5	0

ACCOUNT of the DRILLED.

					£.	s.	d.
5 1/2 ploughings,	—	—	—	—	0	6	0
Even harrowings,	—	—	—	—	0	0	7 1/2
Drilling,	—	—	—	—	0	0	4 1/2
Seed,	—	—	—	—	0	0	3
Hand-hoeing twice,	—	—	—	—	0	2	6
Four horse-hoeings,	—	—	—	—	0	4	0
Drawing and carting, 3d. a ton,	—	—	—	—	0	1	5 1/2
					0	15	2 1/2
Rent,	—	—	—	—	0	17	0
					1	12	2 1/2

					£.	s.	d.
5 1/2 tons, at 2s 4 1/2 d.	—	—	—	—	0	13	7 1/2
Expences,	—	—	—	—	1	12	2 1/2
Produce,	—	—	—	—	0	13	7 1/2
Loss,	—	—	—	—	0	18	6 1/2
Ploughing,	—	—	—	0	6	0	
Harrowing,	—	—	—	0	0	11 1/2	
Drilling,	—	—	—	0	0	2	
Horse-hoeing,	—	—	—	0	2	8	
Carting,	—	—	—	0	2	1 1/2	
					0	11	11
Total loss,	—	—	—	—	1	10	5 1/2

## ACCOUNT of the BROAD-CAST.

EXPENCES.						£.	s.	d.
Six ploughings,	—	—	—	—	—	0	6	0
Five harrowing,	—	—	—	—	—	0	0	7½
Seed,	—	—	—	—	—	0	0	6
Sowing,	—	—	—	—	—	6	0	3
Twice hand-hoeing, 4s. and 2s. 6d.	—	—	—	—	—	0	6	6
Drawing and carting,	—	—	—	—	—	0	7	3
						1	1	1½
Rent, &c.	—	—	—	—	—	0	17	0
						1	18	1½
PRODUCE.						£.	s.	d.
29 ton, at 2s. 4½d.	—	—	—	—	—	3	8	6½
Expences,	—	—	—	—	—	1	18	1½
Profit,	—	—	—	—	—	1	10	5
Ploughing,	—	—	—	—	0 6 0			
Harrowing,	—	—	—	—	0 0 11½			
Carting,	—	—	—	—	0 10 10½			
						0	17	9½
Clear profit,	—	—	—	—	—	0	12	7½
Loss by drilled,	—	—	—	—	—	1	10	5½
Superiority of the broad-cast,	—	—	—	—	—	2	3	0½

## OBSERVATIONS.

No comparison can be more decisive than this: the common husbandry exceeds the new to a great amount, and that, notwithstanding the superior size of the drilled turneps, and their more beautiful appearance. From which we find, that in this mode of drilling (which, however, is not precisely Mr. Tull's direction, for he recommends single rows at six feet) the size of the plants is by no means so good a rule to judge of the crops as the number of them. The broad-cast crop is set out at the distances of from 12 to 18 inches every way; so that the whole ground is actually covered with them: a circumstance (respecting weight) of far more importance than the object of getting large turneps. — For what is the superiority of a pound or two *per* turnep, in a small number, compared, in weight, to a much larger number?

A superiority of 2*l.* 3*s.* 0*d.* *per* acre is so great, that no consideration can balance it. A man would be distracted to practise husbandry on a large scale, by which, on 100 acres, he would, in one year, lose 240*l.* What the result of other modes may be, I know not; but we can, at present, reason only on the experiment before us.

But there is a further consideration of the utmost importance, which is the advantage the farm receives in manure. The proportion of the weight of the crops holds exactly in the quantity of the dung raised by the fatting cattle; to 5  $\frac{1}{2}$  loads from the drilled crop, the broad-cast yields 29 loads.

Suppose six loads spread on one acre, and 29 on another, what an immense difference in all the succeeding crops for several years! No less than an admirable improvement of the whole farm in one case, and a very paltry benefit in the other.

In respect of the expence, the two methods are near on a par, except in the article of carting the crops; which depends not on the mode of culture, but on the weight of crop.

#### EXPERIMENT N<sup>o</sup> 2.

Culture, expences, and produce, of half an acre, in two divisions, field M\*, 1765.

#### CULTURE.

Yielded wheat in 1764; the stubble of which was ploughed up in October. In March gave the first spring ploughing; another in April; a fourth in May, and two harrowings. The beginning of June ploughed it for the fifth time; one half flat, and the other into three-foot ridges. After this earth manured each rood with six loads of farm-yard dung, that had been turned over and mixed twice: turned it in by the sixth earth, which reversed the ridges, and ploughed the other flat. Drilled a single row of seed on the top of each ridge, and harrowed it in on the broad-cast. The extreme drought destroyed an amazing number of turnep crops in this neighbourhood, and many of my own; but these roods luckily escaped. The plants came up pretty well, and missed the fly. They were hand-hoed the latter end of July: the broad-cast half in the common manner; the ridges to the distance of 12 inches from plant to plant. In a few days after horse-hoed the latter, turning furrow from the rows. By the middle of September three more horse-hoings were given, and another hand-hoeing, leaving the ground in a fine state of pulverization, and the plants every where single. The broad-cast part was also hand-hoed a second time. The crops were both good of the kind. I expected, from the experience of last year, to find the drilled turneps come to a larger size than the commonly cultivated ones; but I was mistaken: I could perceive no difference.

difference in this respect, nor yet from weighing; but in *equality* of size, the rows had the better.

The last week in December marked three square perches, chosen for the discovery of an exact medium: the weight of the three drilled was 9 cwt. that of the broad-cast 14  $\frac{1}{2}$  cwt. The beginning of February repeated the trial: the three drilled perches then weighed 9 cwt. 14 lb. The broad-cast 15 cwt.

									Tons.
Proportion <i>per</i> acre of the drilled, first weighing,	—	—	—	—	—	—	—	—	24
Ditto the second,	—	—	—	—	—	—	—	—	25
Average, 24 $\frac{1}{2}$ tons.									
Proportion <i>per</i> acre of the broad-cast, the first weighing,	—	—	—	—	—	—	—	—	38
Ditto the second,	—	—	—	—	—	—	—	—	40
Average, 39 tons.									
Product of the broad-cast,	—	—	—	—	—	—	—	—	29
Ditto of drilled,	—	—	—	—	—	—	—	—	24 $\frac{1}{2}$
Superiority of the former,	—	—	—	—	—	—	—	—	14 $\frac{1}{2}$

### ACCOUNT of the DRILLED.

										£.	s.	d.
EXPENCES.												
Six ploughings,	—	—	—	—	—	—	—	—	—	0	6	0
Four harrowings,	—	—	—	—	—	—	—	—	—	0	0	6
Manuring,	—	—	—	—	—	—	—	—	—	0	11	0
Drilling,	—	—	—	—	—	—	—	—	—	0	0	6
Seed,	—	—	—	—	—	—	—	—	—	0	0	3
Horse-hoeing,	—	—	—	—	—	—	—	—	—	0	4	0
Two hand-hoeings,	—	—	—	—	—	—	—	—	—	0	3	9
Drawing and carting,	—	—	—	—	—	—	—	—	—	0	0	1 $\frac{1}{2}$
										1	12	1 $\frac{1}{2}$
Rent, &c.,	—	—	—	—	—	—	—	—	—	0	17	0
										2	9	1 $\frac{1}{2}$
PRODUCE.										£.	s.	d.
24 $\frac{1}{2}$ tons, at 2s. 4 $\frac{1}{2}$ d.	—	—	—	—	—	—	—	—	—	2	18	2 $\frac{1}{2}$
Expences,	—	—	—	—	—	—	—	—	—	2	9	1 $\frac{1}{2}$
Profit,	—	—	—	—	—	—	—	—	—	0	9	0 $\frac{1}{2}$

Ploughing

				£.	s.	d.	£.	s.	d.
Ploughing,	—	—	—	0	14	4½			
Harrowing,	—	—	—	0	1	6			
Manuring,	—	—	—	0	15	0			
Drilling,	—	—	—	0	0	5			
Horfe-hoeing,	—	—	—	0	6	5			
Carting,	—	—	—	0	15	4½			
							2	13	1
The above profit,	—	—	—				0	9	0½
Loss,	—	—	—				2	4	0½

## ACCOUNT of the BROAD-CAST.

## EXPENCES.

					£.	s.	d.
Six ploughings,	—	—	—	—	0	6	0
Four harrowings,	—	—	—	—	0	0	6
Manuring,	—	—	—	—	0	11	0
Seed,	—	—	—	—	0	0	4
Sowing,	—	—	—	—	0	0	3
Hand-hoeing twice, 4s. and 2s. 6d.				—	0	6	6
Drawing and carting,	—	—	—	—	0	9	9
					1	14	4
Rent, &c.	—	—	—	—	0	17	0
					2	11	4

## PRODUCE.

					£.	s.	d.
39 tons, at 2s. 4½d.	—	—	—	—	4	12	7½
Expences,	—	—	—	—	2	11	4
Profit,	—	—	—	—	2	1	3½
Ploughing,	—	—	—	—	0	14	4½
Harrowing,	—	—	—	—	0	1	6
Manuring,	—	—	—	—	0	15	0
Carting,	—	—	—	—	1	4	4½
					2	15	3
The above profit,	—	—	—	—	2	1	3½
Loss,	—	—	—	—	0	13	11½
Loss by the drilled,	—	—	—	—	2	4	0½
Ditto by the broad-cast,	—	—	—	—	0	13	11½
Superiority of the latter,	—	—	—	—	1	10	0½

## O B S E R V A T I O N S.

This crop of drilled turneps was one of the best I have had, and much exceeded some common ones; but compared with the broad-cast, under a perfect similiarity of circumstances, is vastly inferior: 30s. an acre balance, in favour of the common mode of sowing, is a considerable superiority, and sufficiently decisive of the grand point of comparison between the two methods. But when I say *decisive*, let it be remembered, that I only mean a decisive superiority over the mode of drilling practised in this trial: what better methods may be used is another question, which is not the enquiry at present. I do not think it will be easy to improve this mode of the new culture: spaces of three feet save abundance of the land, which is lost in Mr. Tull's space of six feet.

The loss upon these crops, separately taken, should not alarm the reader: he should consider, that the land, for that loss, receives a very ample manuring for the turneps; and the consumption of the crop raises another excellent dressing for the barley, which, being thus sown upon doubly manured land, cannot fail of being an immense crop, and the succeeding clover and wheat must indubitably be the same. Thus the loss, which appears on the direct balance of a crop, which operates so powerfully in both cleaning and enriching the land, must not carry the only idea of the merit of the culture.

But this view of it shews a further great superiority of the common husbandry: for as the proportion of the manure raised is minutely the same as that of the crops, the amount of the dung of the two methods is as 39 to 24, which superiority will necessarily be found in the barley which follows; also in the clover, and the wheat which is sown upon that. Hence we find the great importance of gaining as large a crop of turneps as possible.

E X P E R I M E N T N<sup>o</sup> 3.

Culture, expences, and produce, of one acre, in two divisions, field G\*, 1765.

## C U L T U R E.

Yielded oats in 1764; the stubble of which was ploughed up in November, and water-furrowed. Turned it out in March: gave the third earth in April, and harrowed it once. In May ploughed it across, and harrowed it again: gave the fifth stirring the beginning of June, throwing one half into four-foot ridges, and left the other half flat. The week following arched up the ridges, and ploughed the other part again flat; drilled double rows on the ridges one foot asunder, and harrowed

in the seed on the other half. The turneps came up very slowly, and being pretty sharply attacked by the fly, I was very fearful the same fate would attend these pieces, as many of my other trials this year. To prevent it, I sowed 20 bushels of foot over each half acre, upon the crowns of the ridges, and all over the flat part: it had the desired effect, and saved the plants. It was, however, the first week in August before they came to the hoe, when the drilled plants were set out one foot asunder, and the broad-cast hoed in the common manner. Horse-hoed the rows thrice in August, and once more the beginning of September; also hand-hoed them again the end of the former month. The broad-cast were likewise hoed a second time.

The middle of January measured out three square perches in each division, in the best, the worst, and the middling parts, which were chosen very attentively, that the mean weight of each crop might be accurately gained. The three drilled ones weighed 6 cwt. 7lb. and the broad-cast 4 cwt. 3 qrs. The first week in March repeated the trial; the drilled then weighed 6 cwt. and the broad-cast 6 cwt. 2 qrs.

					T. C. 2.
Proportion <i>per</i> acre of the drilled, first weighing,	—	—	—	—	16 10 0
Ditto the second,	—	—	—	—	16 0 0
Average, 16 tons, 5 cwt.					
Proportion <i>per</i> acre of the broad-cast, the first weighing,					18 0 0
Ditto the second,	—	—	—	—	17 6 0
Average, 17 tons, 13 cwt.					
Product of the broad-cast,	—	—	—	—	17 13 0
Of the drilled,	—	—	—	—	16 5 0
Superiority of the former,	—	—	—	—	

Proportions *per* acre as follow :

### ACCOUNT of the DRILLED.

					EXPENCES.	£.	s.	d.
Six ploughings,	—	—	—	—		0	6	0
Four harrowings,	—	—	—	—		0	0	6
Water-furrowing,	—	—	—	—		0	0	3
Drilling,	—	—	—	—		0	0	4½
Seed,	—	—	—	—		0	0	3
Manuring,	—	—	—	—		0	15	0
Carried over,	—	—	—	—		1	2	4½



				£.	s.	d.
Brought over,	—	—	—	1	2	4½
Two hand-hoeings,	—	—	—	0	4	6
Four horse-hoeings,	—	—	—	0	3	0
Drawing and carting,	—	—	—	0	4	0½
				1	13	11½
Rent, &c.	—	—	—	0	17	0
				2	10	11½

## PRODUCE.

				£.	s.	d.
16 ½ tons, at 2s. 4½d.	—	—	—	1	18	7
Expences,	—	—	—	2	10	11½
Produce,	—	—	—	1	18	7½
Loss,	—	—	—	0	12	4½
Ploughing,	—	—	0 14	4½		
Harrowing,	—	—	0 1	5		
Drilling,	—	—	0 0	3½		
Horse-hoeing,	—	—	0 4	9		
Manuring,	—	—	0 3	9		
Carting,	—	—	0 10	0		
				1	14	7½
Total loss,	—	—	—	2	6	11½

## ACCOUNT of the BROAD-CAST.

## EXPENCES.

				£.	s.	d.
Six ploughings,	—	—	—	0	6	0
Four harrowings,	—	—	—	0	0	6
Water-furrowing,	—	—	—	0	0	3
Seed,	—	—	—	0	0	6
Sowing,	—	—	—	0	0	3
Manuring,	—	—	—	0	15	0
Two hand-hoeings,	—	—	—	0	6	6
Drawing and carting,	—	—	—	0	4	4½
				1	13	4½
Rent, &c.	—	—	—	0	17	0
				2	10	4½

PRO-

P R O D U C E.					£.	s.	d.
17 tons, 13 cwt. at 2s. 4½d.	—	—	—	—	2	2	5
Expences,	—	—	—	—	2	10	4½
Produce,	—	—	—	—	2	2	5
Loss,	—	—	—	—	0	7	11½
Ploughing,	—	—	—	0 14	4½		
Harrowing,	—	—	—	0	1	5	
Manuring,	—	—	—	0	3	9	
Carting,	—	—	—	0 10	11½		
					1	11	5½
Total loss,	—	—	—	—	1	19	5½
Loss by the drilled,	—	—	—	—	2	6	11½
Ditto by the broad-cast,	—	—	—	—	1	19	5½
Former superiority,	—	—	—	—	0	7	6½

## O B S E R V A T I O N S.

The two methods advance very near each other in this trial; and the reason of the drill culture coming so much nearer to the common husbandry in this than in former comparisons, is owing to the variations of the rows. Had I adhered to the idea I took from Tull of very wide intervals, and single rows, the drilling would always have continued uniformly inferior. But double rows on four-feet ridges is a method which loses very little land; for it is a row in every two feet: and as there is reason to believe, from the general superiority of size in drilled turneps, that the operations of horse-hoeing are more effectual than hand-work, the difference between the land being cropped with a row in every two feet, and the promiscuous way, may, by such superiority of size, be balanced: it is, at least, rational to suppose it, and the present trial strongly confirms the reasoning for the broad-cast, although the number of plants is near double that of the drilled, yet exceeds it in weight only by 28 cwt. which is a trifle: a circumstance which speaks very forceably the excellent effect of horse-hoeing.

The manuring these pieces with soot was expensive; but the effect in increasing the crop was totally unperceivable. I have no reason to think the weight the least advanced by it; but I owe the crop to it, in stepping the depredations of the fly. Soot bears a high character among the writers of husbandry: this result, therefore, may be owing to the extreme dryness

of the season.----Not that such characters are much to be depended on: for, like most other points in rural œconomics, the authors who have treated on manures seem to copy each other in a strange manner; but are backward enough in giving experimental proofs.

#### EXPERIMENT N<sup>o</sup> 4.

Culture, expences, and produce, of a rood, in two divisions, field L\*, 1765.

#### CULTURE.

Marked this piece to try the two methods, under the advantages of the utmost exertions of both tillage and manure. Ploughed it for the first time in October 1764, with four horses, to gain as great a depth as possible, which was about 10 inches. Manured it the same month with eight loads of rotten farm-yard dung, which were turned in directly by a common ploughing, and the piece thoroughly well water-furrowed for the winter. The middle of March gave it the first spring earth, in which I was agreeably surpris'd to find the soil ~~work~~ remarkably mellow and crumbly; the effects of the autumnal dunging. In April ploughed it the fourth time, and harrowed it twice. Gave it two earths in May, and two harrowings: and the first week in June threw half of it on to four-foot ridges by the seventh ploughing, and left the other half flat. On this earth manured it a second time, with four loads of compost, all town manure, consisting of coal-ashes, mortar, rubbish, and rotten hog and horse dung, that had been mixed together: turned it in by the eighth ploughing, arching up the ridges, and leaving the other half flat. Drilled the first with two rows of turneps one foot asunder, and harrowed in the seed on the other.

They both came up well, and outgrew the attacks of the fly, contrary somewhat to my expectations: for when I found how extremely dry and hot the weather was, I feared the plants would be burnt up with heat and manure together: but they flourished very well; were hand-hoed as soon as strong enough to stand the hoe; the broad-cast in the common manner, and the drilled to the distance of one foot in the rows. The last week in July horse-hoed for the first time, turning a furrow from the plants, and throwing up a ridge in the middle of each interval. Gave three more horse-hoeings in August, and one more hand-hoeing to the rows; also hand-hoed the broad-cast part a second time. Both crops went through the season with a remarkable fine appearance, considering the drought they had withstood at the beginning of it, and many of the turneps came to an uncommon size. The beginning of January marked three square perches; one in the best part of each piece, one in a middling part, and the other in the worst: they weighed in the drilled half 14 cwt.

1 qr.

1 qr. and in the broad-cast part 15 cwt. 21 lb. In March repeated the weighing: three perches in the drilled part then came to 13 cwt. 2 qrs. and in the broad-cast to 14 cwt. 1 qr.

				T. C. Q.
Product <i>per</i> acre of the first weighing of the broad-cast,	—			40 10 0
Ditto of the second,	—	—	—	38 0 0
Average, 39 tons 5 cwt.				
Product <i>per</i> acre of the drilled, the first weighing,	—			38 0 0
Ditto the second,	—	—	—	36 0 0
Average, 37 tons.				
Product broad-cast,	—	—	—	39 5 0
Ditto drilled,	—	—	—	37 0 0
Superiority,	—	—	—	<u>2 5 0</u>

## ACCOUNT of the DRILLED.

					EXPENCES.		£. s. d.
Trench-ploughing,	—	—	—	—	0	2	0
Seven common ditto,	—	—	—	—	0	7	0
Six harrowings,	—	—	—	—	0	0	9
Water-furrowing,	—	—	—	—	0	1	0
First manuring,	—	—	—	—	0	14	6
Second ditto,	—	—	—	—	2	2	8
Drilling,	—	—	—	—	0	0	4½
Seed,	—	—	—	—	0	0	3
Two hand-hoeings,	—	—	—	—	0	4	9
Four horse-hoeings,	—	—	—	—	0	3	0
Drawing and carting,	—	—	—	—	0	9	3
							<u>4 5 6½</u>
Rent, &c.	—	—	—	—	0	17	0
							<u>5 2 6½</u>

					PRODUCE.		£. s. d.
37 tons, at 2s. 4½d.	—	—	—	—	4	7	8½
Expences,	—	—	—	—	5	2	6½
Produce,	—	—	—	—	4	7	8½
Carried over, Loss,	—	—	—	—	0	14	10

					£. s. d.
Brought over,	—	—	—	—	0 14 10
Ploughing,	—	—	—	0 19 2	
Harrowing,	—	—	—	0 2 0½	
Manuring,	—	—	—	0 16 0.	
Ditto,	—	—	—	3 0 0	
Drilling,	—	—	—	0 0 3½	
Horse-hoeing,	—	—	—	0 4 9	
Carting,	—	—	—	1 3 1½	
				<hr/>	6 5 4½
Total loss,	—	—	—	—	<hr/> 7 0 2½ <hr/>

## ACCOUNT of the BROAD-CAST.

					EXPENCES.	£. s. d.
Trench-ploughing,	—	—	—	—	0 2 0	
Seven common ditto,	—	—	—	—	0 7 0	
Six harrowings,	—	—	—	—	0 0 9	
Water-furrowing,	—	—	—	—	0 1 0	
First manuring,	—	—	—	—	0 14 6	
Second ditto,	—	—	—	—	2 2 8	
Seed,	—	—	—	—	0 0 6	
Sowing,	—	—	—	—	0 0 3	
Twice hand-hoeing, at 4s. and 2s. 6d.	—	—	—	—	0 6 6	
Drawing and carting,	—	—	—	—	0 9 10	
					<hr/>	4 5 0
Rent, &c.	—	—	—	—	0 17 0	
					<hr/>	5 2 0 <hr/>

					PRODUCE.	£. s. d.
39 ½ tons, at 2s. 4d½.	—	—	—	—	4 13 2	
Loss,	—	—	—	—	0 8 10	
Ploughing,	—	—	—	0 19 2		
Harrowing,	—	—	—	0 2 0½		
Manuring,	—	—	—	0 16 0		
Ditto,	—	—	—	3 0 0		
Carting,	—	—	—	1 4 6½		
				<hr/>	6 1 8½	
					<hr/>	6 10 6½ <hr/>
						Loss

				£.	s.	d.
Loss by the drilled,	—	—	—	7	0	2½
Ditto by the broad-cast,	—	—	—	6	10	6½
Superiority,	—	—	—	0	9	8

## O B S E R V A T I O N S.

I had never formed any idea of profit from either of these crops, as I well knew that turneps would not yield a product sufficient to repay such great expences. The object was to discover which method would best repay great expences: the result is not very decisive; for the difference only of 9s. 8d. in seven pounds is rather trifling. The quantity of the product is also nearly equal; from which we have reason to think, that the effects of horse-hoeing upon land in such very rich order are considerable. This mode of drilling is upon a par with a single row in every two feet of land, which is a much thinner crop than the broad-cast, almost by half, and yet the weight *per* acre nearly equals it. This is owing to the culture in the new method making the turneps grow to a larger size than in the old husbandry; which superiority of *size* nearly balances the superiority of *number*. The crops are both considerable in weight, though not equal (at least the broad-cast) to what I expected from such uncommon manuring.

The loss upon them both shews, that such high expences cannot be repaid by turneps: it is, therefore, in vain to think of them. From the best observations I have been able to make, I think excessive manuring has no proportionable effect on them: but we must not judge from a season so remarkably dry as this was; in a much wetter one, it may take a greater effect than in this year; though in 1764, the same remark was applicable to some of the crops.

Double rows on four-feet ridges coming so near the broad-cast method in product, while single rows on four or five-feet ones have proved so much inferior, affords a good hint for next year's experiments. The nearer we advance to the common mode, so as not to exclude the horse-hoe, seems the most profitable plan.

E X P E R I M E N T N<sup>o</sup> 5.

Culture, expences, and produce, of an acre, in two divisions, field F\*, 1766.

## C U L T U R E.

Yielded spring-corn in 1765; the stubble of which was ploughed up March the 20th: April the 12th, harrowed it; ploughed it again May the 14th; again June the 10th; harrowed it the 18th; rolled it the 25th;



Expences,	—	—	—	—	—	£.	s.	d.
Produce,	—	—	—	—	—	1	13	1
						1	4	11½
Loss,	—	—	—	—	—	0	8	14
Ploughing,	—	—	—	—	0	9	9	
Harrowing,	—	—	—	—	0	1	1½	
Rolling,	—	—	—	—	0	0	0½	
Drilling,	—	—	—	—	0	0	5	
Horfe-hoeing,	—	—	—	—	0	5	7½	
Carting,	—	—	—	—	0	6	6½	
						1	3	6½
Total loss.	—	—	—	—	—	1	11	8

ACCOUNT of the BROAD-CAST.

EXPENCES.

	—	—	—	—	—	£.	s.	d.
Four ploughings,	—	—	—	—	—	0	4	0
Three harrowings,	—	—	—	—	—	0	0	4½
One Rolling,	—	—	—	—	—	0	0	3
Seed,	—	—	—	—	—	0	0	6
Sowing,	—	—	—	—	—	0	0	3
Two hand-hoeings,	—	—	—	—	—	0	6	6
Drawing and carting,	—	—	—	—	—	0	2	11½
						0	14	10
Rent, &c.	—	—	—	—	—	0	17	0
						1	11	10

PRODUCE.

	—	—	—	—	—	£.	s.	d.
11½ tons, at 2s. 4½d.	—	—	—	—	—	1	7	10½
Expences,	—	—	—	—	—	1	11	10
Produce,	—	—	—	—	—	1	7	10½
Loss,	—	—	—	—	—	0	3	11
Ploughing,	—	—	—	—	0	9	9	
Harrowing,	—	—	—	—	0	1	1½	
Rolling,	—	—	—	—	0	0	0½	
Carting,	—	—	—	—	0	7	4	
						0	18	3
Total loss,	—	—	—	—	—	1	2	2½



					£.	s.	d.
Loss by the drilled,	—	—	—	—	1	11	8
Ditto by the broad-cast,	—	—	—	—	1	2	2½
Latter superior by	—	—	—	—	0	9	5½

## O B S E R V A T I O N S.

The new husbandry in this trial comes very near the common method in weight, and the loss is not much greater. This is a very favourable circumstance in it, considering that the rows were drilled equally distant three feet; a much larger space than probably is necessary, if we judge from former trials. I sketched several variations this year, that the continued effect of each mode might be the better known. Had the ridges been four-feet ones, and double rows drilled on them, there is no doubt but the crop would have exceeded the broad-cast: I mean according to the result of former trials. Both the crops are very inconsiderable, which was owing to the poverty of the soil: it wanted a rich manuring to yield a considerable weight of turneps.

E X P E R I M E N T N<sup>o</sup> 6.

Culture, expences, and produce, of one acre, field F\*, 1766.

## C U L T U R E.

Ploughed up the spring-corn stubble in November: gave it another earth in March; two more in April and May; also two harrowings. In the middle of June ploughed half of it on to five-feet ridges; the other flat; and harrowed both, and rolled them across. The latter end of the same month arched up the ridges by the fifth earth, and ploughed the other again flat: drilled the first with three rows of turneps on the top of each ridge, and harrowed in the seed on the broad-cast part. They both came up very well, and were unattacked by the fly. The middle of July horse-hoed the rows, turning a furrow from the plants, and directly hand-hoed them, cutting all the bed well whereon they stood, and which was formed by the horse-hoeing: also hand-hoed the broad-cast part. In August gave two more horse-hoeings, and one hand-hoeing to both parts. The beginning of September horse-hoed for the fourth and last time; but was obliged to give a third hand-hoeing soon after.

The first week in February measured out three square perches in each division, chosen in the best, middling, and worst parts of each. The drilled weighed 5 cwt. 1 qr. the broad-cast 4 cwt. 2 qrs.

					T. C. 2.
Product <i>per</i> acre by the drilled,	—	—	—	—	14 0 0
Ditto by the broad-cast,	—	—	—	—	12 0 0
Superiority,	—	—	—	—	2 0 0

## ACCOUNT of the DRILLED.

						£. s. d.
EXPENCES.						
Five ploughings,	—	—	—	—	—	0 5 0
Five harrowings,	—	—	—	—	—	0 0 7½
One Rolling,	—	—	—	—	—	0 0 3
Drilling,	—	—	—	—	—	0 0 3½
Seed,	—	—	—	—	—	0 0 4
Three hand-hoeings,	—	—	—	—	—	0 6 0
Four horse-hoeings,	—	—	—	—	—	0 4 0
Drawing and carting,	—	—	—	—	—	0 3 6
						1 0 0
Rent,	—	—	—	—	—	0 17 0
						1 17 0

## PRODUCE.

						£. s. d.
15 tons, at 2s. 4½d.	—	—	—	—	—	1 15 7½
Expences,	—	—	—	—	—	1 17 0
Produce,	—	—	—	—	—	1 15 7½
Loss,	—	—	—	—	—	0 1 4½
Ploughing,	—	—	—	—	0 12 2½	
Harrowing,	—	—	—	—	0 1 10½	
Rolling,	—	—	—	—	0 0 0½	
Drilling,	—	—	—	—	0 0 3	
Horse-hoeing,	—	—	—	—	0 4 0	
Carting,	—	—	—	—	0 8 9	
						1 7 1½
Total loss,	—	—	—	—	—	1 8 5½

## ACCOUNT of the BROAD-CAST.

						£. s. d.
EXPENCES.						
Five ploughings,	—	—	—	—	—	0 5 0
Five harrowings,	—	—	—	—	—	0 0 7½
One rolling,	—	—	—	—	—	0 0 3
Carried over,	—	—	—	—	—	0 5 10½

						£.	s.	d.
Brought over,	—	—	—	—	—	0	5	10½
Sowing,	—	—	—	—	—	0	0	3
Seed,	—	—	—	—	—	0	0	6
Two hand-hoeings,	—	—	—	—	—	0	6	6
Drawing and carting,	—	—	—	—	—	0	3	0
						0	16	1½
Rent, &c.	—	—	—	—	—	0	17	0
						1	13	1½

						£.	s.	d.
12 tons, at 2s. 4½d.	—	—	—	—	—	1	8	6
Expences,	—	—	—	—	—	1	13	1½
Produce,	—	—	—	—	—	1	8	6
Loss,	—	—	—	—	—	0	4	7½
Ploughing,	—	—	—	0	12	2½		
Harrowing,	—	—	—	0	1	10½		
Rolling,	—	—	—	0	0	0½		
Carting,	—	—	—	0	7	6		
						1	1	7½
Total Loss,	—	—	—	—	—	1	6	2½
Loss by the drilled,	—	—	—	—	—	1	8	5½
Ditto by the broad-cast,	—	—	—	—	—	1	6	2½
Superiority of the latter,	—	—	—	—	—	0	2	3

## O B S E R V A T I O N S.

This experiment is, in several respects, remarkable. It appears very clearly, that these rows of turneps, on a five-feet ridge, yield a greater produce than the broad-cast manner of sowing. This superiority can be owing to nothing but the effects of the horse-hoeing, so much exceeding those of hand-hoeing: for the *number* of turneps is on the side of the common mode. This comparative circumstance is worthy of attention: for it seems (particularly in this experiment) to be precisely characteristic of the drill culture of turneps. The horse-hoeing evidently makes the turneps something larger than common ones; and this superiority of size is just sufficient to balance a counter-superiority on the side of the broad-cast crops, *viz.* the greater number of plants. The latter

latter are generally left in the hoeing at various distances, as they happen to grow, but never nearer to each other than one foot; perhaps the average distance may be about 14 or 15 inches: suppose 14, each turnep then takes up 196 square inches; whereas by drilling three rows, at one foot on a five-foot ridge, each plant has 240 square inches. This inferiority of number is, we find, more than balanced in the present experiment by the size of the plants; but we know from former experiments, that the effect of increasing the size, in proportion to the decrease of number, holds but in a contracted sphere: no one must expect to find the same proportion, when he gives a much greater space to his horse-hoed plants, as Mr. Tull did, when he extended his single rows of turneps to five feet: and he not only gave into this practice in his own farm, but published it to the world as the only proper mode of culture. Pity that a man of such superior parts should have deviated into so prejudiced a writer!

The drilled crop being attended with a greater loss than the broad-cast, notwithstanding its superiority of product, is owing to the expences of culture being higher. The hand-hoeing three rows is much more troublesome work than single ones, and the horse-hoeing an addition not in the broad-cast part.—Both the crops are paltry ones; but that is owing to the poverty of the soil, which has been much damaged by injudicious treatment.

#### EXPERIMENT N° 7.

Culture, expences, and produce, of one acre, field F\*, 1766.

#### CULTURE.

Ploughed up the stubble in October; turned it out in March; cross-ploughed it in April; harrowed it across the beginning of May, and then gave it the fourth earth, and harrowed it again. The beginning of June ploughed half of it on to five-foot ridges, and the other half flat: then manured the whole equally with 20 loads of rotten farm-yard dung that had been turned over in the yard. Ploughed it in by arching up the ridges, and leaving the other again flat. Drilled the ridges with treble rows, one foot asunder; and harrowed in the seed broad-cast on the other half. Hand-hoed the plants as soon as they were ready, singling those in the rows to the distance of one foot, and the broad-cast ones in the common manner. Gave a horse-hoeing to the ridges in July, and three more in August; also another hand-hoeing to the rows, and the second to the broad-cast half: the crops flourished very favourably, and made a vastly finer appearance than any other experiments in the same field that had no manure.



## ACCOUNT of the DRILLED.

EXPENCES.					£.	s.	d.
Six ploughings,	—	—	—	—	0	6	0
Four harrowings,	—	—	—	—	0	0	6
Manuring,	—	—	—	—	0	4	6
Seed,	—	—	—	—	0	0	4
Drilling	—	—	—	—	0	0	3½
Three hand-hoeings,	—	—	—	—	0	6	0
Four horse-hoeings,	—	—	—	—	0	2	8
Drawing and carting,	—	—	—	—	0	6	6
					<hr/>		
					1	6	9½
Rent,	—	—	—	—	0	17	0
					<hr/>		
					2	3	9½
PRODUCE.					£.	s.	d.
26 ½ tons, at 2s. 4½ d.	—	—	—	—	3	2	4
Expences,	—	—	—	—	2	3	9½
					<hr/>		
Profit,	—	—	—	—	0	18	6½
Ploughing,	—	—	—	—	0	14	7½
Harrowing,	—	—	—	—	0	1	5
Manuring,	—	—	—	—	0	6	3
Carting,	—	—	—	—	0	16	5
Drilling,	—	—	—	—	0	0	3
Horse-hoeing,	—	—	—	—	0	4	0
					<hr/>		
					2	2	11½
The above profit,	—	—	—	—	0	18	6½
					<hr/>		
Loss,	—	—	—	—	1	4	5
Ditto by the broad-cast,	—	—	—	—	1	0	10½
					<hr/>		
					0	3	6½

## OBSERVATIONS.

This experiment turns out very much like the preceding; the new husbandry exceeds the old in produce, but falls something short in advantage, which is owing to the expences being higher. The products are not so considerable as I expected, from the piece being so well manured; and I may likewise remark that this has been the case with several of my other trials this

year: the turnep crops did not answer manuring near so well as in some other years.

Twenty shillings loss per acre on a crop of turneps that are well manur'd for, must not be thought a real loss to that amount, if the advantages of the manuring to the crops which follow, and of the manure raised by the fattening are taken into the account, there will be a considerable profit on it, for 20s. immediate loss are no ballance to such returns.

#### EXPERIMENT N<sup>o</sup> 8.

Culture, expences, and produce, of half an acre, in two divisions, field M\*, 1767.

#### CULTURE.

Yielded wheat in 1766; the stubble of which was ploughed up in November. In April gave it the first spring earth; another ploughing in May, and harrowed it twice. The first week in June threw half of it into five-foot ridges, and ploughed the other half flat: manured them each with five loads of rotten farm-yard dung; ploughed it in the middle of the month, arching up the ridges; the other part flat: drilled the first with three rows of seed one foot asunder, and harrowed it in upon the latter.

The plants came up very favourably, and were hand-hoed as soon as large enough; those in the rows to the distance of a foot from each other, and the others in the common manner. The latter end of July horse-hoed them for the first time; which operation was repeated thrice more in August, and the first week of September; also hand-hoed them twice more, and the broad-cast part once more. Both crops flourished throughout the season very finely: the drilled turneps, from an attentive inspection, appeared rather the larger, separately taken, and the leaves much greener late in the year.

The end of October measured three square perches in different parts of each of the roods, chosen to give the fair medium of the whole. The drilled weighed 12 cwt. and the broad-cast 10 cwt. 2 qrs.

					T. C. Q.
Product <i>per</i> acre of the drilled,	—	—	—	—	32 0 0
Ditto of the broad-cast,	—	—	—	—	28 0 0
Superiority,	—	—	—	—	<u>4 0 0</u>

#### ACCOUNT of the DRILLED.

					EXPENCES.	£.	s.	d.
Five ploughings,	—	—	—	—	—	0	5	0
Four harrowings,	—	—	—	—	—	0	0	6
Carried over,	—	—	—	—	—	<u>0</u>	<u>5</u>	<u>6</u>

						£.	s.	d.
Brought over,	—	—	—	—	—	0	5	6
Manuring,	—	—	—	—	—	0	4	9
Drilling,	—	—	—	—	—	0	0	3½
Seed,	—	—	—	—	—	0	0	4
Three hand-hoeings,	—	—	—	—	—	0	6	4
Four horse-hoeings,	—	—	—	—	—	0	2	8
Drawing and carting,	—	—	—	—	—	0	8	0
						1	7	10½
Rent, &c.	—	—	—	—	—	0	17	0
						2	4	10½

						£.	s.	d.
32 tons, at 2s. 4½d.	—	—	—	—	—	3	16	0
Expences,	—	—	—	—	—	2	4	10½
Profit,	—	—	—	—	—	1	11	1½
Ploughing,	—	—	—	—	0 12 2½			
Harrowing,	—	—	—	—	0 1 6			
Manuring,	—	—	—	—	0 6 3			
Drilling,	—	—	—	—	0 0 3			
Horse-hoeing,	—	—	—	—	0 4 0			
Carting,	—	—	—	—	1 0 0			
						2	4	2½
The above profit,	—	—	—	—	—	1	11	1½
Loss,	—	—	—	—	—	0	13	0½

ACCOUNT of the BROAD-CAST.

						£.	s.	d.
Five ploughings,	—	—	—	—	—	0	5	0
Four harrowings,	—	—	—	—	—	0	0	6
Manuring,	—	—	—	—	—	0	4	9
Seed,	—	—	—	—	—	0	0	6
Sowing,	—	—	—	—	—	0	0	3
Two hand-hoeings,	—	—	—	—	—	0	6	6
Drawing and carting,	—	—	—	—	—	0	7	0
						1	4	6
Rent, &c.	—	—	—	—	—	0	17	0
						2	1	6



P R O D U C E.				£. s. d.
28 tons, at 2s. 4½d.	—	—	—	3 6 6
Expences,	—	—	—	2 1 6
Profit,	—	—	—	1 5 0
Ploughing,	—	—	0 12 2½	
Harrowing,	—	—	0 1 6	
Manuring,	—	—	0 6 3	
Carting,	—	—	0 17 6	
The above profit,	—	—	—	1 17 5½
Loss,	—	—	—	0 12 5½
Loss by the drilled,	—	—	—	0 13 0½
Ditto by the broad-cast,	—	—	—	0 12 5½
Superiority,	—	—	—	0 0 7½

## O B S E R V A T I O N S.

The result of this comparison continues yet the same. The drilled crops yield a greater weight of produce than the common ones, but, from the largeness of the expences, are less profitable; but the balance of the account of loss is too trifling to be mentioned. Both were very fine crops, and undoubtedly brought with them a considerable profit. The loss of twelve or thirteen shillings bears no comparison with the benefit of an ample manuring being paid, and a second provided. When the crops are so considerable, the loss on the account is not to be regarded. Loss there will be in nineteen crops out of twenty. The turnep culture is too expensive in every mode of it to render the first year profitable. If no manure is laid on, the poverty of the crops reduce the product to nothing; and if manured, the expences are greatly increased; and if the manure happens to be expensive, the loss is great. The superiority of four tons *per acre* shews evidently the effects of horse-hoeing to be much greater than of hand-hoeing: for in all these crops drilled with treble rows on five-foot ridges, the *number* of turneps is smaller than in the broad-cast crops; consequently the *size* of them must more than balance that disadvantage. If hand-hoeing be accurately examined, no one will be surprised at this superiority; for the men seldom cut above an inch deep, and sometimes not half an inch; just deep enough to kill the weeds, and thin the turneps, but by no means for them to increase their pasture greatly

greatly in fresh mould, which is the case with horse-hoeing; by which culture, the outward rows at least, have constantly fresh earth to strike into.

### GENERAL OBSERVATIONS ON THIS COMPARISON.

The comparative merit of the old and new husbandry, in the culture of whatever plant, is an object of so much importance, that a man, who makes experimental husbandry his employment, cannot give too minute and accurate an attention to it. I much wish the opportunity of a longer stay on the farm where these trials were made, had allowed me to extend them to a much greater variety: I should, by degrees, have been able to decide not only the general merit of each method, but also the particular advantages of every mode of drilling, with those of every variety in the broad-cast husbandry. This was my object; but a greater number of years would have been requisite to complete such views, and even their completion would have had its attendant disadvantages: for the register of the experiments would have filled folios; whereas the merit of books are too much considered as an appendage to the minuteness of the size: the Greek proverb, *a great book is a great evil*, never was stronger impressed than in this age. The reader must accept a few trials, instead of a great many; and not compare them with ideal excellence, but with those which are already in the possession of the public.

I shall first give the general result of the preceding trials, under the three heads of expences, produce, and profit and loss.

### D R I L L E D.

	EXPENCES.			£.	s.	d.
N <sup>o</sup> 1.	—	—	—	2	4	11
2,	—	—	—	5	2	21
3,	—	—	—	4	5	61
4,	—	—	—	11	7	111
5,	—	—	—	2	16	71
6,	—	—	—	3	4	111
7,	—	—	—	3	18	61
8,	—	—	—	4	9	01
				37	8	11

Average, 4*l.* 13*s.* 6*d.*

This table of expence must be divided into three parts; for the variations are strong: those manured extraordinarily, commonly, and others not manured at all.

EXTRA

## EXTRA MANURED.

				£.	s.	d.
Experiment N <sup>o</sup> 4,	—	—	—	11	7	11½

## COMMONLY MANURED.

				£.	s.	d.
Experiment N <sup>o</sup> 2,	—	—	—	5	2	2½
3,	—	—	—	4	5	6½
7,	—	—	—	3	18	6½
8,	—	—	—	4	9	0½
				17	15	4½

Average, 4*l.* 8*s.* 10*d.*

## UNMANURED.

				£.	s.	d.
Experiment N <sup>o</sup> 1,	—	—	—	2	4	1½
5,	—	—	—	2	16	7½
6,	—	—	—	3	4	1½
				8	4	9½

Average, 2*l.* 14*s.* 11½*d.*

From these particulars it evidently appears that the cultivation of drilled turneps is very expensive, even in the least expensive mode: 2*l.* 14*s.* 11½*d.* is a sum that scarce any crops will pay in the best method of drilling: the loss would, on an average of many, be very great: 4*l.* 8*s.* 10*d.* the average of the commonly manured, is an high rate, and requires a very great produce to repay the expence; but with all ameliorating and cleaning crops, manuring is remarkably profitable: for the advantages of it are not to be expected in such crop, but in all the succeeding ones to the end of the course. Being laid upon turnep land, while in fine tilth, the seeds of all weeds are encouraged to grow, and the ensuing culture, while growing, utterly destroys them in the drill mode, though not totally in the common method, for want of the hoeing being better performed. Thus all the following crops are not only rich, but clean, which should be considered as the object of manuring turneps, not the product of the crops themselves.

But relative to the expences of these crops in general, I should make one remark, which ought not to be forgotten: it concerns the expence

of the operation of drilling. A drill-plough is so uncommon an implement in the country, that the use of it is but little known, and the expences of it are in the same circumstances. I have given, in the preceding charges, the expence of labour and of the horse that draws it; but not the repairs of the plough, as in the case of common tillage, and I think for a fair reason. I know not that my drill-plough is as good as some other sorts; and the expences of a very bad instrument should not be carried to the account of a mode of husbandry in general. Had I charged the real truth, I believe I should not have exaggerated the matter much to have rated the reparations at half a crown an acre: for scarcely ever was it carried into the field without some part or other tumbling in pieces; sometimes at a shilling expence, sometimes five shillings, and sometimes half a guinea: in a word, the expence has been so large, that were it charged, it would absolutely damn the whole of the new husbandry.

The case is peculiarly difficult to decide; for the charge of the horse alone certainly is under the mark. For whatever excellencies a drill-plough might possess, it would undoubtedly require some repairs; and from the complex nature of the machine, in all probability, considerable ones; so that the exclusion of all such expences, from the account, is favouring it in a most peculiar manner, and representing the drill husbandry as more advantageous in every experiment than it really is. But no method of calculating could remedy this difficulty; for I may just as well let the register pass with an acknowledged error, as substitute the pretended remedy of supposition. — It may be said, that I possess truths, and ought to insert them; that is, the real expences I was at:—that common ploughs vary in their structure; some better than others, and requiring much less reparations: that I insert the real repairs of my common ploughs, without knowing them to be perfect instruments. Why not do the same with the drill-plough? — All this has much reason in it; but I am so confident, that the insertion of such expences would render the result of the trials useless, that I cannot bring myself to approve the maxim. Numerous experiments have been laid before the public, without a mention of such expences as I am now considering. The general opinion has been pretty much formed on such experiments; and consequently the perusal of others, which included a very heavy charge never before dreamed of, would confuse all ideas of the husbandry. It would be at once said, *Let us deduct such charge; for certainly this man had a drill-plough not worth a groat: why, therefore, should the new husbandry be charged with expences not belonging to itself, but depending on the badness alone of his instruments?* It would always be said, that the expence of a particular implement ought not to be charged to the general account of any mode: in a word, the reader must, throughout these experiments, supply the omission by an imaginary charge of his own.

## B R O A D - C A S T.

## E X P E N C E S.

				£.	s.	d.
Experiment N <sup>o</sup> 1,	—	—	—	2	15	11½
2,	—	—	—	5	6	7
3,	—	—	—	4	1	10½
4,	—	—	—	11	3	8½
5,	—	—	—	2	10	1
6,	—	—	—	2	14	8½
7,	—	—	—	3	18	6½
8,	—	—	—	3	18	11½
				36	10	4½

Average, 4*l.* 11*s.* 3½*d.*

The table, divided as before, will be as follows :

## E X T R A   M A N U R E D.

				£.	s.	d.
Experiment N <sup>o</sup> 4,	—	—	—	11	3	8½

## C O M M O N L Y   M A N U R E D.

				£.	s.	d.
Experiment N <sup>o</sup> 2,	—	—	—	5	6	7
3,	—	—	—	4	1	10½
7,	—	—	—	3	18	6½
8,	—	—	—	3	18	11½
				17	5	11

Average, 4*l.* 6*s.* 5½*d.*

## U N M A N U R E D.

Experiment N <sup>o</sup> 1,	2	15	11½
5,	2	10	1
6,	2	14	8½
<hr/>			
	8	0	9

Average, 2*l.* 13*s.* 7*d.*

General average drilled,  
Ditto the broad-cast,

Excess of the former,

4	13	6
4	11	3½
<hr/>		
0	2	2½

The

				£	s.	d.
The extra-manured trial drilled,	—	—	—	11	7	11½
Ditto broad-cast,	—	—	—	11	3	8½
Excess of the former,	—	—	—	0	4	2½
Average of the commonly manured drilled,	—	—	—	4	8	10
Ditto broad-cast,	—	—	—	4	6	5½
Excess of the former,	—	—	—	0	2	4½
Average of the unmanured, drilled,	—	—	—	2	14	11½
Ditto broad-cast,	—	—	—	2	13	7
Excess of the former,	—	—	—	0	1	4½

From this table it is sufficiently clear, that the new mode is more expensive than the old,—and that exclusive of the expence of repairing the drill-plough above-mentioned. However, the excess here stated is but trifling, and not an object of importance, if the other parts of the comparison turn out differently. — But this comparison must be examined in another light: it appeared during the course of these experiments, that some modes of drilling proved much more advantageous than others. We must draw a comparison between those modes and the broad-cast: this is absolutely requisite; for the material question to which we must want an answer, is the degree of comparative merit between the *best* mode of drilling and the common husbandry. This comparison is best formed by contrasting the circumstances of the two methods, which are of the same nature. The ploughing, harrowing, water-furrowing, manuring, drawing, and carting, are precisely after the same rates in both: the points to be compared are the drilling, horse and hand-hoeings on one side, with the sowing and hand-hoeing on the other.

*Single rows on five-feet ridges.*

				£	s.	d.
Experiment N <sup>o</sup> 1.	Total expence per acre of seed,			0	9	11½
	drilling, horse and hand-hoeing,			0	9	11½
	Seed, sowing, and hand-hoeing the			0	7	3
	broad-cast,	—	—	0	2	8½
Excess of the drilled,	—	—	—	0	2	8½

*Double rows on four-foot ridges.*

				£.	s.	d.
Experiment N <sup>o</sup> 3.	The drilled,	—	—	0	13	2½
	The broad-cast,	—	—	0	7	3
Excess of the drilled,				0	5	11½
				£.	s.	d.
Experiment N <sup>o</sup> 4.	The drilled,	—	—	0	13	5½
	The broad-cast,	—	—	0	7	3
Excess of the drilled,				0	6	2½

*Single rows on three-foot ridges.*

				£.	s.	d.
Experiment N <sup>o</sup> 2.	The drilled,	—	—	0	15	4
	The broad-cast,	—	—	0	7	1
Excess of the drilled,				0	8	3
				£.	s.	d.
Experiment N <sup>o</sup> 5.	The drilled,	—	—	0	14	10½
	The broad-cast,	—	—	0	7	3
Excess of the drilled,				0	7	7½

*Treble rows on five-foot ridges.*

				£.	s.	d.
Experiment N <sup>o</sup> 6.	The drilled,	—	—	0	14	10½
	The broad-cast,	—	—	0	7	3
Excess of the drilled,				0	7	7½
Experiment N <sup>o</sup> 7.	The drilled,	—	—	0	13	6½
	The broad-cast,	—	—	0	7	3
Excess of the drilled,				0	6	3½
Experiment N <sup>o</sup> 8.	The drilled,	—	—	0	13	10½
	The broad-cast,	—	—	0	7	3
Excess of the drilled,				0	6	7½

These are the articles in which the drilled crops are more expensive than the common ones, and we here find the exact amount of the excess, excepting only the unregistered expence of the reparation of the drill-plough. The amount is considerable, rising, upon an average, nearly to half the rent of the land, which is adding more to the expences of culture than most farmers would ever be induced to think of. The greatest excess is in the single rows on three-foot ridges; but the most advantageous mode of drilling is what we should chiefly attend to. This is the treble rows on five-foot ridges; the excess in them is about 7s. an acre: I shall, therefore, venture, from the evidence of these facts, to contradict the assertions of those writers, who insist that the drill culture is, on all soils, cheaper than the broad-cast.

## P R O D U C T.

## D R I L L E D.

				T.	C.	Q.
Experiment N <sup>o</sup> 1,	—	—	—	5	15	0
2,	—	—	—	24	10	0
3,	—	—	—	16	5	0
4,	—	—	—	37	0	0
5,	—	—	—	10	10	0
6,	—	—	—	14	0	0
7,	—	—	—	26	5	0
8,	—	—	—	32	0	0
				166	5	0

Average, 20 tons 15 cwt. 2 qrs.

## B R O A D - C A S T.

				T.	C.	Q.
Experiment N <sup>o</sup> 1,	—	—	—	29	0	0
2,	—	—	—	39	0	0
3,	—	—	—	17	13	0
4,	—	—	—	39	5	0
5,	—	—	—	11	15	0
6,	—	—	—	12	0	0
7,	—	—	—	24	6	0
8,	—	—	—	28	0	0
				200	19	0

Average, 25 tons 2 cwt. 1 qr.



					T. C. Q.
Broad-cast,	—	—	—	—	25 2 1
Drilled,	—	—	—	—	20 15 2
Superiority of the former,	—	—	—	—	<u>4 6 3</u>

## EXTRA MANURED.

					T. C. Q.
Experiment N <sup>o</sup> 4. Broad-cast,	—	—	—	—	39 5 0
Drilled,	—	—	—	—	37 0 0
Superiority,	—	—	—	—	<u>2 5 0</u>

## COMMONLY MANURED.

					T. C. Q.
Experiment N <sup>o</sup> 2. Broad-cast,	—	—	—	—	39 0 0
3. Ditto,	—	—	—	—	17 13 0
7. —	—	—	—	—	24 6 0
8. —	—	—	—	—	28 0 0
Average, 27 tons, 4 cwt. 3 qrs.					<u>108 19 0</u>

					T. C. Q.
Experiment N <sup>o</sup> 2. Drilled,	—	—	—	—	24 10 0
3. Ditto,	—	—	—	—	16 5 0
7. Ditto,	—	—	—	—	26 5 0
8. Ditto,	—	—	—	—	32 0 0
Average, 24 tons 15 cwt.					<u>99 0 0</u>

					T. C. Q.
Broad-cast,	—	—	—	—	27 4 3
Drilled,	—	—	—	—	24 15 0
Superiority,					<u>2 9 3</u>

## U N M A N U R E D.

					T. C. Q.
Experiment N <sup>o</sup> 1.	Broad-cast,	—	—	—	29 0 0
5.	Ditto,	—	—	—	11 15 0
6.	Ditto,	—	—	—	12 0 0
					<hr/>
					52 15 0

Average, 17 tons, 11 cwt. 2 qrs.

					T. C. Q.
Experiment N <sup>o</sup> 1.	Drilled,	—	—	—	5 15 0
5.	Ditto,	—	—	—	10 10 0
6.	Ditto,	—	—	—	26 5 0
					<hr/>
					42 10 0

Average, 14 tons 3 cwt. 1 qr.

					T. C. Q.
Broad-cast,	—	—	—	—	17 11 2
Drilled,	—	—	—	—	14 3 1
					<hr/>
Superiority,	—	—	—	—	3 8 1

These comparisons include all the modes of drilling; we must, therefore, divide them according to number and distance of rows.

*Single rows on five-foot ridges.*

					T. C. Q.
Experiment N <sup>o</sup> 1.	Broad-cast,	—	—	—	29 0 0
5.	Ditto drilled,	—	—	—	5 15 0
					<hr/>
Superiority,	—	—	—	—	23 5 0

*Single rows on three-foot ridges.*

					T. C. Q.
Experiment N <sup>o</sup> 2.	Broad-cast,	—	—	—	39 0 0
5.	—	—	—	—	11 15 0
					<hr/>
					50 15 0

Average, 25 tons 7 cwt. 2 qrs.

Experiment N<sup>o</sup> 2. Drilled,  
5. Ditto,

— —  
— —

—  
—

T. C. Q.

24 10 0  
10 10 0

35 0 0

Average, 17 tons, 10 cwt.

Broad-cast,  
Drilled,

— —  
— —

—  
—

T. C. Q.

25 7 2  
17 10 0

Superiority,

— —

—

7 17 2

*Double rows on four-feet ridges.*

Experiment N<sup>o</sup> 3. Drilled,  
4. —

— —

—  
—

T. C. Q.

16 5 0  
37 0 0

53 5 0

Average, 26 tons, 12 cwt, 2 qrs.

Expe-

Experiment N<sup>o</sup> 3. Broad-cast,  
4. Ditto,

— —  
— —

—  
—

T. C. Q.

17 13 0  
39 5 0

56 18 0

Average, 28 tons, 9 cwt.

Broad-cast,  
Drilled,

— —  
— —

—  
—

T. C. Q.

28 9 0  
26 12 2

Superiority of the former,

— —

—

1 16 2

*Treble Rows, on five-feet Ridges.*

Experiment N<sup>o</sup> 6. Drilled,  
7. Ditto,  
8. Ditto,

— —  
— —  
— —

—  
—  
—

T. C. Q.

14 0 0  
26 5 0

32 0 0

72 5 0

Average, 24 tons 1 cwt. 2 qrs.

Expe-

### Experiment N<sup>o</sup> 6. Broad-cast,

7. \_\_\_\_\_  
8. \_\_\_\_\_

<i>T.</i>	<i>C.</i>	<i>Q.</i>
12	0	0
24	6	0
28	0	0
64	6	0

Average, 21 tons 8 cwt. 2 qrs.

Drilled,	—	—	—	24	1
Broad-cast,	—	—	—	21	8
Superiority,	—	—	—	2	13 0

I have inserted these several comparisons, that the reader may be able to view the point in every light : but the treble rows are principally to be attended to ; as several of the preceding experiments were formed, not only without a just guide, but under the auspices of a false one ; for I took my first idea of drilled turneps from Mr. Tull : experience, by degrees, threw me into a better practice ; and the result was the treble rows on five-feet ridges. It appears from the comparison, that this mode of drilling exceeds the broadcast by 2 tons 13 cwt. per acre : a material fact ; because it proves (without taking profit and loss into the account) that horse-hoeing is much more efficacious to this crop than hand-hoeing. It may be said, and doubtless will be by the general advocates for the drill culture, *that reason would have told us this without a five years course of experiments.* But points in agriculture, that are proved by reason alone, are of but little worth : I had much rather bring such a point to the proof of experiment, than establish the most brilliant hypothesis from reason alone. Reason, unaided by minute experiments, for ever over-leaps the bounds of both.

## PROFIT AND LOSS.

D R I L L E D.					<i>l.</i>	<i>s.</i>	<i>d.</i>
Experiment N <sup>o</sup> 1,	Loss,	—	—	—	1	10	5½
2,	—	—	—	—	2	4	0½
3,	—	—	—	—	2	6	11½
4,	—	—	—	—	7	0	2½
—	—	—	—	—	1	11	8
Carried over,	—	—	—	—	14	13	4

					£. s. d.
Brought over,	—	—	—	—	14 13 4
Experiment N <sup>o</sup> 6,	—	—	—	—	1 8 5½
7,	—	—	—	—	1 4 5
8,	—	—	—	—	0 13 0½
					<hr/>
					17 19 3½

Average, 2*l.* 4*s.* 9½*d.*

## B R O A D - C A S T.

					£. s. d.
Experiment N <sup>o</sup> 2, Loss,	—	—	—	—	0 13 11½
3,	—	—	—	—	1 19 5½
4,	—	—	—	—	6 10 6½
5,	—	—	—	—	1 2 2½
6,	—	—	—	—	1 6 2½
7,	—	—	—	—	1 0 10½
8,	—	—	—	—	0 12 5½
					<hr/>
N <sup>o</sup> 1, Profit,	—	—	—	—	13 5 8½
					0 12 7½
					<hr/>
					12 13 1

Average, 1*l.* 11*s.* 7½*d.*

					£. s. d.
Loss by the drilled,	—	—	—	—	2 4 9½
By the broad-cast,	—	—	—	—	1 11 7½
					<hr/>
Superiority of the latter,	—	—	—	—	0 13 2

As I gave the comparative weight of the crops in every variation, I shall here only offer the parallel between the treble rows and the broad-cast.

					£. s. d.
Experiment N <sup>o</sup> 6. Drilled, Loss,	—	—	—	—	1 8 5½
7.	—	—	—	—	1 4 5
8.	—	—	—	—	0 13 0½
					<hr/>
					3 5 11½

Average, 1*l.* 1*s.* 11½*d.*

				£.	s.	d.
Experiment N <sup>o</sup> 6, Broad-cast, Loss,	—	—	—	1	6	2½
7,	—	—	—	1	0	10½
8,	—	—	—	0	12	5½
				2	19	6½

Average, *ol.* 19s. 10d.

				£.	s.	d.
Drilled, Loss,	—	—	—	1	1	11½
Broad-cast ditto,	—	—	—	0	19	10
Superiority of the latter,	—	—	—	0	2	1½

This superiority is by no means large; and it is on the inferior crop in weight; so that no striking conclusions can be drawn from the mere amount of the sum: but there are other considerations not to be overlooked.

The superiority of weight marks a more advantageous culture *in general*, which is a point of much importance, as in all probability it would be attended with greater consequences in a long course of years: crops that are cultivated minutely, according to their genius, will, in the long run, be better able to encounter bad seasons and accidents; an object deserving of some attention.

This superiority of weight also carries with it a superiority in the dung arising from the fattening of the cattle; which is certainly more than sufficient to balance the loss of 2s. an acre.

But the principal point here to be considered is the state of the land after each crop: this is a matter of great consequence: hitherto the methods are even; this must therefore form the balance. I have not a regular series of trials to decide this point, by comparing the barley of each piece; for other enquiries in that, and so many varieties in the corn husbandry, would not allow me to give such an extended attention to every link of the long chain of experiment. I viewed the crops of barley very attentively, not only alone, but with various farmers; but unexpectedly could not perceive a regular superiority of either in the goodness of them; though if there was a difference, the drilled parts had the advantage. This seemed to be the small balance of all our opinions: but we remarked in the fields variously manured, that the smallest addition of dung far more than equalled such advantage. But in the respect of *cleanness*, the superiority of the crops, after the drilled turneps, was manifest: this we all agreed in, and the degree of it was considerable.

The tillage bestowed on the rows of turneps was not only more expensive, but more than proportionably advantageous. The hand-hoeing the rows, from the regularity of their position, was better performed than the broad-cast hoeing; and the turneps having three of those operations, the crowns of the ridges were in finer order than the commonly cropped land: but the advantages of the horse-hoed intervals are far beyond any thing in the common mode. Four horse-hoings upon land in good tillage have a great effect in pulverizing the soil; so that the intervals are throughout the season, and at the end of it, in as fine order as any garden, and infinitely superior to any common fallow. It appears very remarkable to me, that such advantages, apparently of the utmost importance, should not produce a greater superiority in the succeeding barley crop: however, the cleanness of it is an advantage that ought by all good farmers to be much prized: it turns the scale, and, I think, gives me sufficient reason to determine, that the best mode of drilling turneps (treble rows on five-feet ridges) here used, is superior to the broad-cast culture of that root.

## S E C T. IV.

## Of the APPLICATION of the CROP.

SOME of my readers may, perhaps, smile at my forming a section for the insertion of a single experiment: I have but one to register under this head; but that has been conducted during four years, which is fortunately as long as the case requires. It was begun in common with others, without any intention of continuing it for the discovery of the most advantageous application of a turnep crop. By the *application*, I mean the method of consuming them: the comparison here lies between the two modes of feeding them on the ground with sheep, or drawing them for fattening beasts in stalls.

## - · EXPERIMENT.

Culture, expences, and produce, of one acre, in two divisions, during the years. 1764, 1765, 1766, and 1767, field M\*.

1764.

This acre yielded oats in 1763; the stubble of which was ploughed up in November. The first spring-earth was given in March; another and an harrowing in April: stirred it again in May. The beginning of June manured it equally with 20 loads of rotten farm-yard dung, that had been twice stirred over: ploughed in the dung the 18th, and harrowed in the turnep seed. The plants arose very favourably, received no attacks from the fly, and were hand-hoed (for the first time) the 16th of July, when they were set out in the common manner. The whole crop was a very regular one: gave it a second hand-hoeing, which left them in good order.



The first of January divided the acre in halves, and turned 30 sheep in to one half: they fairly eat them off in exactly two weeks and two days. The keeping them in this manner was worth 3*d.* *per* head *per* week, consequently the half acre paid 16*s.* 10½*d.* or 1*l.* 13*s.* 9*d.* *per* acre.

At the same time that I turned in the sheep, I put two steers to stall fatting on the other half: they cost me 15*l.* 15*s.* 6*d.* They had always straw in their racks, but no hay; and that with which they were littered was bought of a neighbour, at 11*s.* a load, and laid by itself in the barn near the beasts.

The half acre lasted them nine weeks; during which time they eat, and were littered with two loads of straw. Sold them from the turneps for 17*l.* 14*s.* 6*d.* Product of the half acre 1*l.* 19*s.* 0*d.* The dung was carefully preserved by itself, laid up in a square heap before the door, all the urine being thrown on it every day, and twice turned during the fatting, to forward its rotting. The quantity carted away directly to the turnep land 16 loads. I found, by weighing, the weight of the crop to be 34 tons *per* acre.

### ACCOUNT of the HALF ACRE FED OFF.

EXPENCES.				£.	s.	d.
Five ploughings,	—	—	—	0	2	6
Three harrowings,	—	—	—	0	0	2½
Manuring,	—	—	—	0	3	9
Seed,	—	—	—	0	0	3
Sowing,	—	—	—	0	0	1½
Hand-hoeing,	—	—	—	0	3	3
				0	10	0½
Rent, &c.	—	—	—	0	8	6
				0	18	6½
PRODUCE.						
Received for sheep-feed,	—	—	—	0	16	10½
Loss,	—	—	—	0	1	8½
Ploughing,	—	—	—	0	2	6
Harrowing,	—	—	—	0	0	3½
Manuring,	—	—	—	0	3	11½
				0	6	9
Total loss,	—	—	—	0	8	5½

ACCOUNT

## ACCOUNT of the HALF ACRE DRAWN.

EXPENCES.					£.	s.	d.
Five ploughings,	—	—	—	—	0	2	6
Three harrowings,	—	—	—	—	0	0	2½
Manuring,	—	—	—	—	0	3	9
Seed,	—	—	—	—	0	0	3
Sowing,	—	—	—	—	0	0	1½
Hand-hoeing,	—	—	—	—	0	3	3
Drawing and carting,	—	—	—	—	0	4	3
Two loads of straw,	—	—	—	—	1	2	0
Labour, in feeding and cleaning the cattle, and turning the dung,	—	—	—	—	0	15	6
					<hr/>		
					2	11	9½
Rent, &c.	—	—	—	—	0	8	6
					<hr/>		
					3	0	3½
PRODUCE.							
Profit on the beasts,	—	—	—	—	1	19	0
					<hr/>		
Loss,	—	—	—	—	1	1	3½
Ploughing,	—	—	—	—	0	2	6
Harrowing,	—	—	—	—	0	0	3½
Manuring,	—	—	—	—	0	3	11½
Carting home,	—	—	—	—	0	6	4½
					<hr/>		
					0	13	1½
					<hr/>		
Total loss,	—	—	—	—	1	14	5½

## OBSERVATIONS on the CROPS of 1764.

The reader will please to observe, that I have carried the comparison quite through the first year. The using the crop for stall-feeding is evidently made more expensive than the feeding it off with sheep: but this expence is in the preceding account minuted at the highest; the straw is all bought, though I had much of my own. Stubble would have been much cheaper for the littering part, but it is not always to be had; whereas straw is every where to be bought; and it is necessary to charge the price of it, because a farmer may probably have a regular stock of cattle for the straw of his crop: in which case he cannot stall-feed to advantage without buying more.

This crop was very good: it was a favourable turnep year; and the land being well dunged, threw out an extremely regular as well as a fine produce.

1765.

The 25th of March ploughed both the pieces. This was the first season that would allow of tillage, or I should have ploughed them before. The 6th of April gave them another earth; upon which I carried the dung of the stalled beasts, and spread it on the half acre drawn: and the 18th a third earth, harrowing in two bushels of barley seed on each half acre, and 8 lb. of seed-clover on each. The land worked fine and well; nor did the dung (which my workmen expected) incommode the harrows. The barley came up very favourably; but that on the dunged part stronger and of a deeper green than the fed half. The season proved an uncommon drought, unfavourable to the crops on dry lands. I could not see till harvest whether the clover had taken; nor did I then know if the crop was regular. The dunged barley carried the best appearance throughout the season; but both were very fine crops. Mowed them the middle of August. Produce of the fed half 16 bushels; the drawn part 22.

## ACCOUNT of the FED HALF ACRE.

EXPENCES.				£.	s.	d.
Three ploughings,	—	—	—	0	1	6
Three harrowings,	—	—	—	0	0	2½
Seed,	—	—	—	0	4	10
Sowing,	—	—	—	0	0	1½
Mowing,	—	—	—	0	0	7
Harvesting,	—	—	—	0	1	0
Threshing,	—	—	—	0	2	0
				<hr/>		
Rent, &c.	—	—	—	0	10	2½
				0	8	6
				<hr/>		
				0	18	8½

PRODUCE.				£.	s.	d.
16 bushels, at 19s. 6d.	—	—	—	1	19	0
Expences,	—	—	—	0	18	8½
Profit,	—	—	—	1	0	3½

Ploughing,

				£.	s.	d.	£.	s.	d.
Ploughing,	—	—	—	0	3	7			
Harrowing,	—	—	—	0	0	6½			
Carting in harvest,	—	—	—	0	0	3½			
							0	4	5
Clear profit,	—	—	—				0	15	10½

ACCOUNT of the DRAWN HALF ACRE.

					£.	s.	d.
EXPENCES							
Three ploughings,	—	—	—		0	1	6
Three harrowings,	—	—	—		0	0	2½
Seed,	—	—	—		0	4	10
Sowing,	—	—	—		0	0	1½
Manuring,	—	—	—		0	3	2
Mowing,	—	—	—		0	0	7
Harvesting,	—	—	—		0	1	0
Threshing,	—	—	—		0	2	9
					0	14	1½
Rent, &c.	—	—	—		0	8	6
					1	2	7½

					£.	s.	d.
PRODUCT.							
22 bushels, at 19s 6d.	—	—	—		2	13	7½
Expences,	—	—	—		1	2	7½
Profit,	—	—	—		1	10	11½
Ploughing,	—	—	—	0	3	7	
Harrowing,	—	—	—	0	0	6½	
Carting in harvest,	—	—	—	0	0	3½	
Manuring,	—	—	—	0	3	0	
					0	7	5
Clear profit,	—	—	—		1	3	6½

OBSERVATIONS on the CROP of 1765.

I have been particularly unfortunate this year: so severe a drought as lasted most part of this summer was remarkably unfavourable to crops that were highly manured;—not in reducing their products lower than the

the unmanured ones, but in preventing the soil from yielding a return proportionable to the manure. This I am confident has been strongly the case with these crops, but more particularly with the danged ones: 32 loads *per* acre are a noble dressing; and upon turnep land that had before been manured must, I am very clear, have yielded a considerably larger crop than this. The dry weather was also unfavourable to the fed part; but I apprehend not in the same proportion. It was requisite to carry in mind this circumstance of season, as it ever materially affects experiments in husbandry.

1766.

The dry weather of 1765 had kept the clover so low, that I had discerned but little before harvest; but the autumnal rains brought it up in fine vigour, infomuch that I was surpris'd to find the ground completely covered. I turned no cattle into it to eat off this young growth, but left it to wither in the winter, and keep the plants warm. This year I mowed it for hay twice, and after the second mowing had a small feeding for sheep, which I valued. The fed half yielded, at the two mowings, 1 ton 1 cwt. of dry hay. The drawn half, 1 ton 13 cwt.

## ACCOUNT of the FED HALF.

EXPENCES.				£.	s.	d.
Seed,	—	—	—	0	2	6
Sowing,	—	—	—	0	0	1½
Mowing and making twice,	—	—	—	0	3	9
				0	6	4½
Rent, &c.	—	—	—	0	8	6
				0	14	10½
PRODUCE.				£.	s.	d.
1 ton 1 cwt. at 35s.	—	—	—	1	16	9
Value of the after-feed,	—	—	—	0	1	0
				1	17	9
Expences,	—	—	—	0	14	10½
Profit,	—	—	—	1	2	10½
Carting the hay,	—	—	—	0	0	10
Clear profit	—	—	—	1	2	0½
				ACCOUNT		

## ACCOUNT of the DRAWN HALF.

EXPENCES.					£.	s.	d.
Seed,	—	—	—	—	0	2	6
Sowing,	—	—	—	—	0	0	1½
Mowing and making,	—	—	—	—	0	4	0
					0	6	7½
Rent,	—	—	—	—	0	8	6
					0	15	1½
PRODUCE.					£.	s.	d.
1 ton 13 cwt. at 35s.	—	—	—	—	2	4	9
After-feed,	—	—	—	—	0	1	6
					2	6	3
Expences,	—	—	—	—	0	15	1½
Profit,	—	—	—	—	1	11	1½
Carting the hay,	—	—	—	—	0	0	10
Clear profit,	—	—	—	—	1	10	3½

## OBSERVATIONS on the CROP of 1766.

These crops of clover-hay are ~~very~~ considerable; but the season was extremely favourable to the production of grafs. The latter half acre has much the advantage in the quantity of the product: indeed, I find from the farmers, that they think the manure of the sheep in feeding a crop of turneps does not, according to their general idea, pay more than the value of the turneps, which seldom varies more than from 25s. to 36s. *per* acre, fed off. Now there can be no doubt of 32 loads of dung being of a much greater value to the land than that sum, and must last longer good: however, the conclusion of this experiment will decide that point. The wetness of this year has made amends for the dryness of last, and brought up such a thick and ~~luxuriant~~ crop of clover, that I think it cannot fail bringing a fine one of wheat, from so putrid a shade as such a vegetable gives, and the fall of so much leaf.

1767.

I ploughed up this acre the 21st of October, and directly harrowed in two bushels of red wheat: a favourable season followed, which made

the wheats in general carry a very good countenance. These crops looked extremely well throughout the season: they were reaped the latter end of August, and threshed directly. Product of the fed half, seven bushels; of the drawn half, eleven bushels, three pecks.

### ACCOUNT of the FED HALF.

EXPENCES.						£.	s.	d.
One ploughing,	—	—	—	—	—	0	0	6
Harrowing,	—	—	—	—	—	0	0	2½
Seed,	—	—	—	—	—	0	6	0
Sowing,	—	—	—	—	—	0	0	1½
Reaping,	—	—	—	—	—	0	2	0
Harvesting,	—	—	—	—	—	0	1	0
Threshing,	—	—	—	—	—	0	2	4
						0	12	1½
Rent, &c.	—	—	—	—	—	0	8	6
						1	0	7½
PRODUCE.						£.	s.	d.
7 bushels, at 49s.	—	—	—	—	—	2	2	10½
Expences,	—	—	—	—	—	1	0	7½
Profit,	—	—	—	—	—	1	2	2½
Ploughing,	—	—	—	—	0 1 2½			
Harrowing,	—	—	—	—	0 0 6½			
Carting,	—	—	—	—	0 0 3½			
						0	2	0½
Clear profit,	—	—	—	—	—	1	0	2

### ACCOUNT of the DRAWN HALF.

EXPENCES.						£.	s.	d.
One ploughing,	—	—	—	—	—	0	0	6
Three harrowings,	—	—	—	—	—	0	0	2½
Seed,	—	—	—	—	—	0	6	0
Sowing,	—	—	—	—	—	0	0	1½
Reaping,	—	—	—	—	—	0	2	0
Carried over,	—	—	—	—	—	0	8	9½

						£.	s.	d.
Brought over,	—	—	—	—	—	0	8	9½
Harvesting,	—	—	—	—	—	0	1	0
Threshing,	—	—	—	—	—	0	3	11
						0	13	8½
Rent, &c.	—	—	—	—	—	0	8	6
						1	2	2½
PRODUCE.						£.	s.	d.
11 bushels, 3 pecks, at 49s.	—	—	—	—	—	3	11	11½
Expences,	—	—	—	—	—	1	2	2½
Profit,	—	—	—	—	—	2	9	8½
Ploughing,	—	—	—	—	0 1 2½			
Harrowing,	—	—	—	—	0 0 6½			
Carting in harvest,	—	—	—	—	0 0 3½			
						0	2	0½
Clear profit,	—	—	—	—	—	2	7	8

# OBSERVATIONS ON the CROP of 1767.

This year was remarkably unfavourable to wheat: but those on the gravelly loams did much the best;—accordingly these crops suffered less than many of my others. The product of the drawn half shews, that the dunging lasted this year in good perfection; but I do not think the other half profited greatly by it. For on these gravels, with good management, without the assistance of manure, crops, equal to fourteen bushels, have this year been gained: and although on this spot it might not possibly have amounted so high, yet it could scarcely have been less than twelve bushels; whereas the other half is much more considerable. Experiments require a long course of years to attain perfection: I now find that in the present one, there ought to have been three, instead of two divisions. A crop of turneps unmanured for, and drawn and fed on grass land, or at least no dung brought back; in that case we should have had a standard, by which to have judged of the other two divisions. Thus are the trials of four years but hints for future ones:—a long life and a noble fortune might both be expended in an uninterrupted acquisition of husbandry knowledge.



## R E C A P I T U L A T I O N.

## The D R A W N H A L F.

			£.	s.	d.
1765. Profit <i>per</i> acre on the barley,	—	—	2	7	1½
1766. Ditto on the clover,	—	—	3	0	7
1767. Ditto on the wheat,	—	—	4	15	4
			10	3	0½
1764. Loss on the turneps,	—	—	3	8	10½
Clear profit, which is <i>per</i> acre <i>per</i> annum, <i>nl.</i> 13s. 6d.			6	14	2

## The F E D H A L F.

			£.	s.	d.
1765. Profit <i>per</i> acre on the barley,	—	—	1	11	8½
1766. Ditto on the clover,	—	—	2	4	1
1767. Ditto on the wheat,	—	—	2	0	4
			5	16	1½
1764. Loss on the turneps,	—	—	0	16	10½
Clear profit, which is <i>per</i> acre <i>per</i> annum, <i>nl.</i> 4s. 9d.			4	19	3
Clear profit, in four years, on the drawn half,			6	14	2
Ditto on the fed,	—	—	4	19	3
Superiority in four years,	—	—	1	14	11

Which is *per* acre *per* annum, *ol.* 8s. 8½d.

## O B S E R V A T I O N S O N T H I S E X P E R I M E N T.

This comparison is carried through a complete course, and presents a clear view of the advantages of both methods of using turneps. To feed them on the ground is the most compendious,—the most easy,—and performed at a much less expence: but to draw them for stall-feeding beasts is the most profitable by 8s. 8d. an acre *per* annum, which is a considerable superiority.

The common opinion is contrary to this result: the farmers think no method so profitable as that of feeding with sheep: but such an idea, supposing it true in their practice, militates nothing against the fact apparent in this trial. If they manure for a crop of turneps, as well as this acre was dressed, they may feed them on the land, and doubly manure it in that manner; but most assuredly they will not preserve the dung arising from the beasts stall-fed on the turneps of a certain field,

field, and spread it on that field alone; they will never think of such a conduct, but certainly lay the dung on another field that has not been so lately manured. It is true the dung makes a show wherever laid; but in a year or two the crops, after fed and drawn turneps, are viewed, without the circumstance of the dung being laid elsewhere occurring: in which case it is no wonder that the finest crops are seen after feeding.

But another point of very great importance in this husbandry is the supplying the fattening beasts with plenty of litter. When a farmer stall-feeds, he has no thought but that of giving no more than necessary, unless he has more than his regular crop consumes: but as to buying any, not one in forty will ever think of doing it; so that probably the crop is expended without half the dung being raised that ought in reason to be expected. Such a disadvantage, it is evident, must be a very unfavourable circumstance to the application of the crop to stall-feeding.

It is on these accounts that the common opinion is so much in favour of feeding off the crop with sheep.

But surely the reason of the thing must speak the same language as this experiment. How can a month's keeping of 30 sheep, on an acre of land, manure it equally with 32 loads of ox dung? A month of 30 is a week of 120. Now 120 sheep in a week will not fold, in a manner to equal the rate of 20 load of good dung *per* acre, above 15 square perches, or at the most 20, which is only the eighth part of an acre. This comparison I draw from viewing folded land, and from the general idea: but I confess it is by no means experimental. But without determining the quantity to be 15 or 20 perches, we may very fairly conclude, that the *whole acre* will receive no advantage comparable to the manuring of 32 loads of ox dung, even in its unrotten state. The difference, I should have conceived, would have proved greater than 1*l.* 14*s.* 11*d.* *per* acre in four years; and I think there is so much reason in that conjecture, that had the seasons of barley and wheat been more favourable, I have little doubt but the superiority would have been much greater.

However, 8*s.* 8*d.* *per* acre, every year, during a lease on land of 17*s.* an acre, is lowering the rent above *half*; an object of very great consequence. Above forty pounds a year in an hundred acres of arable is a matter highly worth the attention of every farmer.

A further advantage certainly remains in the land: for the difference of yielding this year 14 bushels of wheat, or 23, cannot sink to nothing in the year following. The succeeding turneps would certainly have proved superior in one part to the other, had I been able to continue the experiment longer.

How far it was a disadvantage to the drawn part to lay on the dung before it was rotten, cannot appear in this experiment. The common opinion is against such a practice; but common opinions in these matters are not absolutely to be relied on: perhaps it would have been more advantageous to have turned it over once or twice in the summer, and spread it on the barley stubble, for the direct improvement of the clover crop.

I shall, upon the whole, venture to recommend to all farmers, who have it in their power to chuse between these two methods of consuming a turnep crop, to determine in favour of drawing them, and to allow the beast fatted, or kept on them, as much litter as they will make into dung. This is absolutely necessary: they may depend on the great profit of this conduct, and on its being superior to that of feeding off with sheep. If they are situated on soils too wet to feed on them, then they should not regret the inability of pursuing a conduct not less profitable than that which is in their own power.

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## C H A P. II.

### O F C A R R O T S.

**T**HIS root is not cultivated in common in any part of this neighbourhood : but in the maritime part of the county, between Woodbridge and the sea, every farmer has a crop of them, not only for feeding their horses, (thinking this food requisite, in a degree, to keep them in health) but also for sending to London by shipping. It is a culture that has been long known in their parts : the soil is particularly adapted to it, being a deep, and often a rich sand, totally different from any land on this farm. But the great profit ~~reaped~~ by those farmers induced me to try if this root would ~~not~~ thrive on stiffer soils. The books that have treated of it ~~all tell us~~, that you must have sand for them ; but I had found those gentlemen so often mistaken, that I put no absolute confidence in their assertions. — The reader should not expect in the following trials to meet with an uninterrupted success ; for as I began the culture, contrary to all rule, so I determined to try it on all my soils, from a clay to a gravelly loam. Some of them must of course be unfavourable ; but I shall insert none in this register that do not yield, either in the good or bad success, a lesson to others, which I should have valued when I began, but could not procure.

~~The method used~~ in the culture of carrots near Woodbridge is the broad-cast alone ; nor did I ever hear of or see a field of them in drills. As I made it my business to devise and try experiments on whatever plants fell within my notice, and applied the new husbandry to most of them, carrots were in the number.

But as the seed was drilled by hand, and from its nature I apprehend impossible to be shed regularly by a drill-plough, I shall omit inserting them

them, not being clear of their utility. Those in the common method are applicable to every person that has such soils as myself.

### EXPERIMENT N<sup>o</sup> 1.

Culture, expences, and produce, of half a rood, field M\*, 1764.

#### CULTURE.

This piece yielded oats in 1763; the stubble of which was ploughed up with four horses the beginning of March, gaining ten inches of depth, and harrowed it twice. By Lady-day gave it two common earths; upon the last of which, after two harrowings, I sowed half a pound of seed, covering it by a third harrowing. The seed came up; but it was five weeks from sowing before I could distinguish the young carrots sufficiently, among the weeds, to hoe them for the first time: the latter formed quite a thicket, so that I feared much it would be impossible to clear them away, without at the same time destroying the crop: however, I set two boys to work to weed them by hand. They went on very slowly, and effected nothing but checking the growth of the weeds enough to give the young carrots the power of shewing themselves. I paid these boys 4*d.* each day, and the piece took them three days. As soon as they had finished it, I sent two labourers in to hand-hoe them in the turnep manner, with orders that they should set the plants at twelve inches distance from each other. This they executed very well; the expence 2*s.*

The last week in June I found, on viewing the crop, a vast number of weeds, notwithstanding the two former operations: I, therefore, went to work again with them, hoed them up, and wherever the carrots discovered any neglect in the former thinning, it was remedied now, and the piece left in a very clean and husband-like order. I saw plainly, from the growth of the plants, that they would be no bad crop: they were regular, with fine branching tops, of a good colour.

I found it necessary (in harvest) to give another hoeing, which was but a light one, to cut some weeds that shewed themselves.

Dug up the crop in October: this was performed with four-tine forks and spades, but chiefly the former. The carrots came up tolerably easy, and but few of them were broken. I carted them directly home; and, cutting off the tops, left the roots to dry, and cleaning them from the dirt that adhered to them, laid them in an out-house.

The quantity was 31 bushels, exclusive of the tops, which were eaten (as cut off) by the swine very heartily. I gave them to some weaned pigs; also to a sow with pigs, and found them all to feed with great eagerness on them. I gave some (by way of trial) to a cow, and found

that

that he preferred them to all other food. I likewise tried a beast fattening on turneps and hay with them, and he, after becoming acquainted with the flavour, evidently preferred them to the turneps: but the principal use I made of them was for my hogs. The value of them I calculated with as much accuracy as possible, with the assistance of my bailey: we determined the value to be one shilling a bushel.

The carrots were not long in general, but of a good thickness. The common length was from twelve to eighteen inches, and as large again as a man's wrist: some few of a very considerable size; and some much forked and deformed, which I suppose to be owing to the hardness of the ground under them.

PROPORTIONS *per* acre as follow:

EXPENCES.				£.	s.	d.
One trench-ploughing,	—	—	—	0	2	0
Two common ditto,	—	—	—	0	2	0
Five harrowings,	—	—	—	0	0	7½
Seed,	—	—	—	0	6	0
Sowing,	—	—	—	0	0	9*
Weeding by hand,	—	—	—	0	16	0
First hand-hoeing,	—	—	—	0	16	0
Second ditto,	—	—	—	0	6	0
Third ditto,	—	—	—	0	3	6
Digging up,	—	—	—	0	10	6
Carting home, cutting off the tops, cleaning, and laying up,	—	—	—	0	10	0
				3	13	4½
Rent, &c.	—	—	—	0	17	0
				4	10	4½

PRODUCE.				£.	s.	d.
248 bushels, at 1s.	—	—	—	12	8	0
Expences,	—	—	—	4	10	4½
Profit,	—	—	—	7	17	7½
Ploughing,	—	—	—	0	4	0
Harrowing,	—	—	—	0	1	0½
Carting home 10 loads, at 2½d.	—	—	—	0	1	10½
				0	6	11
Clear profit,	—	—	—	7	10	8½

\* Sown at three casts.

## O B S E R V A T I O N S.

This first trial of carrots gave me very great pleasure and encouragement. My soil was by no means the proper one, according to all the accounts I received: it was, therefore, a matter of some triumph to me to be able to raise so very profitable a crop, contrary to the very nature of the land. That the soil is (for carrots) faulty, I am very well convinced: it is not deep enough; that is, I could not plough it with my common instruments deep enough; for I found the same soil as deep as I could stir, which was from nine, varying to twelve inches; a gravelly loam, dry and sound, but very strong work to plough; good wheat land, but dry enough for turneps. The carrots penetrated lower than I ploughed: but had it been stirred deeper, they would certainly have been larger.

The appearance of the ground when the plants came up was sufficient to frighten one: it was covered with weeds, quite thick. Had the piece been five acres, I should have trembled at the thoughts of cleaning it, and certainly had ploughed it up: but this trial shews, that we should by no means decide so hastily with carrots. The season of sowing them is the occasion of this circumstance: the month of May and beginning of June, if wet, is the high season for seed-weeds. Upon land that is tolerably ploughed, and sown at Lady-day with a crop that makes no head against the weeds, they may be supposed to triumph. The turnep-fallow, through this season, kills them; and the turneps themselves are so soon after sowing ready to hoe, that none of consequence can rise to do mischief: but the carrots give the weeds nine or ten weeks to get a-head, and then ~~are so young and weak~~, that the utmost attention is requisite to distinguish them. ~~This is the reason of the culture being so extremely expensive.~~ The cleaning this crop comes to two guineas an acre; whereas an acre of turneps is hoed for 6s.

But notwithstanding these circumstances, which are so unfavourable, yet the product is so considerable, that it makes ample amends: 248 bushels of clean carrots, besides the tops, (which by the way are of some value, for not a sprig is lost, the lean swine eating them with great avidity) are a crop that is never equalled by any common one cultivated by our farmers. The average of the wheat-fields in this neighbourhood do not rise to four pounds *per acre*. Thus is this crop of carrots better *per acre* than three crops of wheat: — a noble produce! And this most profitable return is made by a vegetable, that is undoubtedly equal to turneps, as a fallow and preparer for barley. About Woodbridge, I am told, their barleys are much the finest after carrots. This is not surprizing; for so much hoeing as is bestowed on them, with the thickness of the shade they yield, cannot fail of exceeding turneps; and the  
superior

superior depth of ploughing for them, probably answers the greater number of earths given to that crop.

A clear profit of 7*l.* 10*s.* 0*d.* an acre, on a fallow crop, is so great an acquisition, that I am surpris'd this culture is not more common. Soil is undoubtedly a great matter; but the farmers think too much of it: if you propose an article of culture to them of this sort, they have their answer always ready,—*Our land is different.* But it is sufficiently clear, that I might have made the same answer to a Woodbridge farmer. I think that on most gravelly soils, dry and sound enough to be what is commonly called good turnep land, and which will admit ploughing nine or ten inches deep, that upon such soils carrots may every where safely be cultivated without fear of great profit.

#### EXPERIMENT N<sup>o</sup> 2.

Culture, expences, and produce, of half an acre, field M\*, 1765.

#### CULTURE.

Yielded barley in 1764; the stubble of which I ploughed up in October; first a common furrow, about seven or eight inches deep, and then another plough with four horses; turned another furrow at the bottom of that; gained by this means the depth of from twelve to fifteen inches, and so left it for the winter. March the 18th, gave it a common stirring; harrowed it twice, and then sowed it at three casts. It was the beginning of May before any plants could be distinguished, and they were then enveloped in a thicket of weeds: however, the experience of last year urged me not to be frightened at that appearance; but thought that the requisite cleaning might be given at first with hoes by men, instead of trusting to boys, who, through idleness, made their work much dearer than men's. May the 20th, I set three men to work with small four-inch hoes, ordering them to crawl along on their knees, and wherever they could see any young carrots to strike with their hoes around them, and then, with their fingers, pluck away the weeds that grew close to them. This operation they performed pretty well; and after it was done, the carrots shewed themselves enough to prove that the crop would be a regular one. The weeds, however, presently arose, and we found that many had taken root again. One of the labourers then suggested a thought, which totally escaped me, to harrow them: beans and turneps, he said, were commonly harrowed without damage, and that the teeth would destroy the weeds slightly in the ground, or that were wounded by the hoe. I had no harrows but strong and heavy ones; but I ventured to try them. I followed the harrow (the land was quite dry) to observe the effect, and found that it did much good, and that the carrots were left by it



even much thicker than necessary; but few of them being destroyed I made them harrow the whole over twice in a place. The season came on very dry, and unfavourable to the growth of every thing. I left them till the second week in June, designing then to hand-hoe them with large hoes; but a day of heavy rain came, which prevented me. This rain brought them on finely: they had the start of the weeds after the harrowing; so that I could at any time have hoed them, but I staid, that it might be the more effectual. The 22d of June hand-hoed them with ten-inch hoes, leaving them a very regular crop, from twelve to eighteen inches asunder, cutting up all the weeds.

The whole month of July passed without rain, which was a favourable circumstance to this culture; for I could not see that the crop was in any want of it, and the drought kept it quite clean from weeds. The carrots carrying so good an appearance, at a time when most crops were burnt up, must have been owing to the deep ploughing, and their drawing moisture from a greater depth than is ever penetrated by the sun. No rains fell till the 13th of August: the fine refreshing showers that fell then brought up some weeds, which were killed by a slight hoeing the beginning of September. The first week in November dug up the crop, and left them lying on the ground two days to dry, which (the weather being favourable) had a good effect; carted them home, and cut off the tops, which were eat by the hogs, and laid them up in an out-house for winter's use. The quantity 147 bushels. They were in general very fair and strait, but few of them forked, and the size varying from two to five inches diameter: some of them were two feet long, and none shorter than twelve inches.

Respecting the application of the crop, I gave them to all sorts of cattle; horses, cows, fatting beasts, lean cattle, swine of all sorts, young pigs just weaned, sows with pigs, &c. &c. but what I was most accurate in to gain the real value of them, was in fatting hogs. I bought three lean hogs, which cost me 2*l.* 8*s.* 0*d.* and confined them to a sty to be fattened on carrots. They were in fine order, well fattened on sixty-six bushels of carrots, and eighteen of bran, given in the following method: the carrots were boiled till they would mash with a little difficulty, but not too soft: they were then put into a tub, and a small quantity of bran mixed with them, and when cold given regularly to the hogs. The account as follows:

					<i>£.</i>	<i>s.</i>	<i>d.</i>
Cost of the hogs,	—	—	—	—	2	8	0
18 bushels of bran,	—	—	—	—	0	9	0
Labour in boiling and mixing, and coals,	—	—	—	—	0	9	0
					3	6	0
					Sold		

				£.	s.	d.
Sold them directly from the carrots for	—	—	—	6	6	0
Expences,	—	—	—	3	6	0
Remains the product of the carrots,	—	—	—	3	0	0

Which is just 11d. *per* bushel. This price I shall adhere to in the present experiment: but I could perceive very clearly, that keeping young pigs, and fows and pigs, on them raw, paid a better price; but as I did not try it accurately, so shall not calculate from it.

					£.	s.	d.
EXPENCES.							
One trench-ploughing,	—	—	—	—	0	1	0
Two common ditto,	—	—	—	—	0	1	0
Five harrowings,	—	—	—	—	0	0	3½
Seed,	—	—	—	—	0	2	6
Sowing,	—	—	—	—	0	0	4½
First hoeing,	—	—	—	—	0	15	0
Second ditto,	—	—	—	—	0	6	0
Third ditto,	—	—	—	—	0	4	0
Digging up,	—	—	—	—	0	7	0
Carting home, topping, cleaning, and laying up,	—	—	—	—	0	5	0
					2	2	2½
Rent, &c.	—	—	—	—	0	8	6
					2	10	8½

					£.	s.	d.
PRODUCE.							
147 bushels, at 11d.	—	—	—	—	6	14	9
Expences,	—	—	—	—	2	10	8½
Profit,	—	—	—	—	4	4	0½
Ploughing,	—	—	—	0 2 0			
Harrowing,	—	—	—	0 0 6½			
Carting home,	—	—	—	0 2 2½			
					0	4	9
Clear profit, 7l. 18s. 7½d. <i>per</i> acre,	—	—	—	—	3	19	3½

## OBSERVATIONS.

This is a noble crop, and far exceeds any thing in the common husbandry of this neighbourhood. Near eight pounds an acre, clear profit, on a crop

of so expensive a nature, and the chief of the expence consisting in tillage and hoeing, and consequently preparing admirably for succeeding ones of corn, or any other vegetable, is so beneficial a culture, that I cannot help expressing my surprize at its not being more common. That it is an excellent fallow year, cannot, I think, be doubted; for very deep tillage being given before winter, adds greatly to the staple of the soil. My men told me, while I was ploughing to that depth, that I should ruin the land, by bringing up the dead earth: but a winter frost coming on, this dead earth, and then a whole summer of hoeing, so ameliorates it, that it must no longer be called by that name; for I have experienced that excellent barley is gained the year after deep ploughing, without any signs of mischief from dead earth; and besides the hoeing, the shade of a thick crop of carrots is of great efficacy in enriching the soil.

This experiment is a proof that the culture of carrots is by no means adapted only to sandy soils. This field is good wheat land, a strong gravelly loam, and yet the crop is excellent, and shews no signs of any impropriety of sowing it on this soil.

I would not, however, be thought to assert the equality of this loam to rich sands, since I am clearly of opinion the latter must be superior, and the crops around Woodbridge shew it; for they reckon them very often to amount to 20/. an acre, and sometimes to more. But other soils not being equal in goodness, ought not to prevent the culture being tried. Should I reject a clear profit of 8/. an acre, because it is not 12/. when I could not get 4/. by any thing else? I will venture to assert, that the carrot culture is one of the most profitable in the world on these soils, though not exactly the right sort: and of this I am so much convinced, that I ~~am determined~~ to increase my quantity, by degrees, every year, until I get all my turnep lands into a regular course of carrots, instead of turneps. Until the profit is established, under a variety of seasons and circumstances, I shall not extend my trials at once to whole fields, but I shall increase it every year.

#### EXPERIMENT N<sup>o</sup> 3.

Culture, expences, and produce, of ten perches, field L\*, 1765.

#### CULTURE.

The soil of this field is a clayey loam, much too wet for turneps, according to general ideas; but I thought it was proper to try the culture of carrots on every soil, that the variations attending them might be accurately known. The idea I previously formed was, that this land would prove too stiff and wet for them. The ten perches formed one bed or stretch. I ploughed in the double manner in October: the first plough made a common furrow, and struck a deeper one at the bottom of

that by four horses; but from the stiffness of the soil could gain no greater depth than from ten to twelve inches: I cut a deep water-furrow across it, in the lowest part, to lay it quite dry during the winter. I had the pleasure to find that the frosts pulverized the clods brought up by the second ploughing; for I was fearful, from their first tenacity, that they would not break sufficiently in the winter. The latter end of March gave it a common ploughing; harrowed it twice, and sowed the carrot-feed, and covered it by a third harrowing; which three harrowings left the land fine enough. The plants arose in about two months, and without so great a number of weeds as in the former trials, which, I suppose, was owing to the under stratum of this soil either not being so full of the seeds of weeds, or not so well adapted to make them vegetate: but the young carrots did not seem hurt by this quality; for they came on very well.

The middle of June I gave the first hand-hoeing with the large hoes: the extreme dryness of the season having seconded the poverty of the soil so well, that not many weeds had arose. This hoeing set out the plants to the distance of one to two feet from each other; the crop not being so thick of plants as to admit them all at the distance of only twelve or eighteen inches. In August a second hoeing was given, which completed the culture. Dug them up the beginning of November, managing them in the same manner as the preceding crops. Produce  $8\frac{1}{2}$  bushels. The carrots strait and well-looking, but small; used them in feeding a sow and pigs. Value, from an accurate calculation, 1s. 0 $\frac{1}{4}$ d. per bushel.

### PROPORTIONS *per* ACRE.

#### EXPENCES.

	£.	s.	d.
One trench-ploughing,	0	2	0
Two common ditto,	0	2	0
Three harrowings,	0	0	4 $\frac{1}{2}$
Water-furrowing,	0	0	6
Seed, —	0	5	0
Sowing, —	0	0	9
First hand-hoeing, —	0	14	6
Second ditto, —	0	10	0
Digging up, —	0	5	3
Carting, cleaning, &c.	0	4	0
	2	4	4 $\frac{1}{2}$
Rent, &c. —	0	17	0
	3	1	4 $\frac{1}{2}$
	P R O -		

P R O D U C E.						£.	s.	d.
136 bushels, at 1s. 0½d.	—	—	—	—	—	7	1	8
Expences,	—	—	—	—	—	3	1	4½
Profit,	—	—	—	—	—	4	0	3½
Ploughing,	—	—	—	—	0 2 0			
Harrowing,	—	—	—	—	0 0 6½			
Carting,	—	—	—	—	0 1 6½			
						0	4	1½
Clear profit,	—	—	—	—	—	3	16	2

## O B S E R V A T I O N S.

This trial I must be allowed to think an important one: for carrots to prove so profitable a crop on land, which by all accounts is utterly improper for them, is more surprising than the much larger crops I gained on my gravelly loam. A clear profit of 3*l.* 16*s.* 2*d.* is by no means a matter to be slighted. I know not any other crop, which on this land would yield a product of seven pounds an acre, without having any manure. Thus I may venture to recommend this culture to farmers and gentlemen, who do not, at present, dream of possessing an acre of land that will do for it; and I will further venture to assure them of the profit of it. There can be no doubt but such deep staple being gained, must have excellent effects on succeeding crops; and the under stratum being exposed a year and a half to the weather, to two winters and one summer, and being well hand-hoed in the latter, all together cannot fail of ameliorating and sweetening the soil, and rendering the part newly turned up equal to the old surface: and these effects being gained, at the same time that a most profitable crop is produced, upon the whole, render this husbandry at least worthy of more attention than it has hitherto received.

But the method I followed in this experiment was very faulty: the land most undoubtedly should have been well manured, which would have secured a much greater crop of carrots, and contributed greatly to the further sweetening of the soil. I cannot see any good reasoning against manuring the land for carrots, notwithstanding the opinion of some gardening writers against it: but I purpose to try it in various degrees.

EXPERIMENT N<sup>o</sup> 4.

Culture, expences, and produce, of a rood, field R\*, 1766.

## CULTURE.

This piece yielded wheat in 1765; the stubble of which was ploughed up in October; double furrowed: a plough first with two horses, going the depth of about seven inches, and then another with four, in the same furrow, gaining in all the depth of fourteen inches. I perceive, from attending to this mode of trench-ploughing, that I must have a plough made on purpose for the work, narrower than common, and with a higher mould-board; by which means, I apprehend, we might gain a greater depth, but not a regular one; for the furrow would be narrower at bottom than at top.

The first fortnight in March was as fine weather as ever known at that season: I made use of the opportunity to manure this piece with six loads of rotten farm-yard dung that had been turned over twice; ploughed it in, harrowed the land twice, and on that sowed the carrots, covering them by a third harrowing. They came up very favourably, but much involved in young weeds; so that the men were forced to hoe them with small four-inch hoes, with short handles. This work was performed the 14th of May; after which harrowed them twice, which left the crop in a proper order for the great hoe.

The end of June hand-hoed them again, to the distance of from twelve to eighteen inches asunder; cutting up all the weeds, breaking the surface thoroughly, and leaving the crop in a perfect garden order. The season being a remarkable growing one, the carrots profited much from this accurate culture: they grew surprisingly, were of a fine verdure, and had large spreading tops. A constant succession of showers and fine weather brought up a fresh crop of weeds, and made it necessary to give another hoeing, which was accordingly performed the beginning of August; and a fourth slight one the first week in September, which consisted only in cutting up a few weeds that had escaped the former hoeings. I was determined the carrots should not be robbed of their nourishment by such enemies, and therefore I attended particularly to keeping them totally clean. Dug up the crop in October; cut off the tops, cleaned them, and laid them up for winter's use, as before. The product 109 bushels.

I used this crop, like my others, in various methods: but that which I attended to with the most accuracy, for gaining an exact value, was the feeding some weaned pigs, given raw; and that I might be able to discover the degree of use they were of, I confined ten pigs to one sty, and fed them with pollard and a small quantity of wash: the first was given variously, according to the wants of the pigs, and so as to keep

them in proper order and thriving. Confined ten others of the same sort and size to an adjoining sty, and fed them with raw carrots, and a small portion of wash every day: the quantity of the carrots was guided on the principle of keeping the pigs in as good order as the others were kept by the pollard: and that the food might take full effect, and shew itself sufficiently, to form a clear judgment, I kept the pigs in this manner for a month; during all which time, both parcels throve extremely well, and equally. The result of the trial, on casting up the two accounts, was, that the carrots, at 1s. 2d. a bushel, formed the equality with the pollard.

### PROPORTIONS *per* ACRE.

#### EXPENCES.

					£.	s.	d.
Trench-ploughing,	—	—	—	—	0	2	0
Two common ditto,	—	—	—	—	0	2	0
Five harrowings,	—	—	—	—	0	0	7½
Seed and Sowing,	—	—	—	—	0	4	9
Manuring,	—	—	—	—	0	11	1
First hand-hoeing,	—	—	—	—	1	4	6
Second ditto,	—	—	—	—	0	9	0
Third ditto,	—	—	—	—	0	5	6
Fourth ditto,	—	—	—	—	0	2	3
Digging up,	—	—	—	—	0	17	6
Carting, cleaning, topping, and laying up,	—	—	—	—	0	13	6
					4	12	8½
Rent, &c.	—	—	—	—	0	17	0
					5	9	8½

#### PRODUCE.

					£.	s.	d.
436 bushels, at 1s. 2d.	—	—	—	—	25	8	8
Expences,	—	—	—	—	5	9	8½
					19	18	11½
Profit,	—	—	—	—			
Ploughing,	—	—	—	0	9	7	
Harrowing,	—	—	—	0	1	10½	
Manuring,	—	—	—	0	7	6	
Carting,	—	—	—	0	4	4	
					1	3	3½
Clear profit,	—	—	—	—	18	15	8

O B S E R.

## O B S E R V A T I O N S.

This experiment alone, had I no other authority, is sufficient to prove the very great profit of the carrot culture: I know not what will equal it; nothing, I am sure, that is commonly cultivated on these soils. The land, I imagine from this trial, chiefly wants fertility, for producing large crops of this most valuable root: for the ploughing, although I did not gain near the depth of which I was desirous, was yet sufficient for the production of some as fine carrots as were ever beheld; many were from fifteen to twenty inches in circumference, and from eighteen to twenty inches, and even three feet long, of which lengths I measured two or three; but the size at the small end trifling, as may be supposed. The length of the roots proves, that they penetrate far below the plough; so that a matter of as great importance as very deep ploughing is to enrich the surface well, that the plants may have a great strength and vigour to push their tap-roots into the unstirred earth. It is easy to conceive a plant, with a long ~~tap-root~~, may draw in the chief of its nourishment through the fibres, which spread near the surface; so that if you enrich the earth greatly, in which those fibres shoot, the whole root will grow the larger, even those parts (supposing there are any such) that do not draw in any nourishment from the land. Thus the upper surface directs the size of the root, and the under strata are nothing more than a support, and proper situation for it to swell in: and according to this reasoning, a rich surface will make some amends for want of a great depth of ploughing; but then the soil must be such as is penetrable. I would not, however, be supposed to think, that the carrot draws all its nourishment from the surface: the fibres which shoot from its bottom part, as well as the upper, are a strong contradiction to such an opinion. I only mean, that fertilizing the first ten or twelve inches of the land, will enable the root to shoot through the next twelve inches, whether they add to its growth or not, and to make it swell to a large size in that under stratum, even supposing it a *caput mortuum*.

To throw the great importance of this culture into as clear a light as possible, let us compare it with the common husbandry of this soil. This was the turnep year; the product of which might have amounted to three or four pounds *per* acre, and probably with a loss of twenty or thirty shillings. What a contrast to the product of 25*l.* *per* acre, and the profit of 20*l.*! And in respect to the quality of preparing for barley, and so on for clover and wheat, I have found, from repeated experience, that the carrots much exceed the turneps; and no wonder: for the tillage given them is not inferior, if allowance be made for the trench-ploughing, the hoeing is infinitely more effectual; for the carrots are, literally speaking, kept as clean as a garden during the whole season, and the shade of their



branches far thicker than that of turneps, raising consequently a more putrid fermentation. But another advantage, superior perhaps to all these, is the crop being off the land time enough to give it an autumnal ploughing for the winter, and left perfectly free from all treading, carting, or poaching in the wet season; so that it is in just the same degree of order (relative I mean to pulverization, and superior in all other respects) as summer fallowed land laid up for barley.

Let any one consider all these advantages attendant on a crop that yields a produce of 25*l.* *per* acre, and a profit clear of 18*l.* Suppose the farmer makes 30*s.* an acre clear by his barley, 30*s.* by his clover, and 40*s.* by his wheat, he will lose 25*s.* by the turneps; so that the net profit of the course will be only 3*l.* 15*s.* 0*d.* but call it 4*l.* or twenty shillings *per* acre *per* annum, not one acre in forty pays such a clear profit in this country; and yet this *single* crop of carrots more than equals that profit on four courses. At the end of the carrot year I have more profit in pocket than the farmer at the end of eighteen years! If this does not shew the value of carrots, I know nothing that can.

A culture that renders one acre as valuable as eighteen, highly deserves the attention of gentlemen, who keep but a small quantity of land in their hands. By introducing this culture, they may evidently make a very considerable profit by their husbandry on a small tract of land.

I have spoken of carrots as a mere substitute for turneps one year out of four; but I design trying them again on this rood next year. I have a crop this year on land that yielded them the last, which is better than the first: nor do I see any reason to think that so much tillage and culture should not prepare for another crop of themselves, as well as for any other.

#### EXPERIMENT N<sup>o</sup> 5.

Culture, expences, and produce, of a rood, field M\*, 1766.

##### CULTURE.

This rood is the half of the piece registered in Experiment N<sup>o</sup> 2. 1765. After that crop was taken up, I trench-ploughed this rood with two ploughs and six horses, as before; and the work being lighter, we gained another inch, if not two, in depth. The first week in March manured it with five loads of rotten farm-yard dung; ploughed it in, and harrowing twice, sowed it again with carrots, and covered with another harrowing. They came up much enveloped in weeds, but not to the usual degree. I was surprised at seeing any weeds, expecting that the tillage, &c. of the preceding crop would have almost extirpated them: however, the number of weeds was evidently lessened, though not quite reduced; and they were hoed with four-inch hoes the middle of

of May. Set them out to their proper distances, by a second operation with large hoes, the last week in June. This hoeing left them in most excellent order; the ground well broken, perfectly free from weeds, and the carrots made a beautiful appearance. No more cleaning was given to this piece till the end of August, when they were hand-hoed again. They were dug up in October: the produce 117 bushels. They were taken up and managed as before, given to the lean hogs, to the sows and pigs, and also to some young cattle. The average value *per* bushel, in the several applications minuted, 1s. 1d.

## EXPENCES.

£. s. d.

Trench-ploughing,	—	—	—	—	0	2	0
Two common ditto,	—	—	—	—	0	2	0
Three harrowings,	—	—	—	—	0	0	4½
Seed,	—	—	—	—	0	5	0
Sowing,	—	—	—	—	0	0	9
First hand-hoeing,	—	—	—	—	1	0	0
Second ditto,	—	—	—	—	0	12	0
Third ditto,	—	—	—	—	0	5	0
Manuring,	—	—	—	—	0	9	6
Digging up,	—	—	—	—	0	5	0
Carting, cleaning, topping, and laying up,	—	—	—	—	0	4	0
					3	5	7½
Rent,	—	—	—	—	0	17	0
					4	2	7½

## PRODUCE.

£. s. d.

468 bushels, at 1s. 1d.	—	—	—	—	25	7	0
Expences,	—	—	—	—	4	2	7½
Profit,	—	—	—	—	21	4	4½
Ploughing,	—	—	—	—	0	9	7
Harrowing,	—	—	—	—	0	1	1½
Manuring,	—	—	—	—	0	6	3
Carting home,	—	—	—	—	0	5	6
					1	2	5½
Clear profit,	—	—	—	—	20	1	11

## O B S E R V A T I O N S.

This trial shews very clearly, that carrots may be twice sown on the same land with increasing profit; and that whenever such a conduct is pursued, there will be a great probability that the second crop will much exceed the first. This is a matter of more importance than may, at first, be obvious: for why throw carrots into a course of one crop in four years, if the land will yield carrots every year? Why sow crops that will pay twenty shillings profit on land that will yield as many pounds under this root? I shall sow this root again next year, and entertain not the smallest doubt but the crop will be to the full as good as this, and, in all probability, continue so for several years, if the soil is well manured every now and then.

The profit on this crop is extremely great, and gives me, I think, no vain hope of rendering all my gravelly loams extremely advantageous. I have cultivated so many of my fields under a regular loss, and the rest for so small a profit, from common husbandry, that I could, at first, scarcely believe a profit resulting from my land of twenty pounds an acre. But my experiments on carrots have convinced me, that the occupiers of these soils may apply them to, at least, twenty times great profit than they reap at present. I am determined to increase my carrot annually, until I have nothing else on these gravelly loams.

It is to be remarked, that the *profit* on this crop is greater in proportion to the *produce* than that of the preceding ones; and this is owing to its being the second on the same land. The culture of the first reduces the weeds greatly, though it could not extirpate them; so that the expense of cleaning the second is much lower; and upon the same principles, that of the third will be lower still. It is a vast recommendation of any article of culture, that it keeps the land not only in excellent tillage and good heart, but also perfectly free from weeds. This is a point which will never be neglected by truly good husbandmen.

E X P E R I M E N T N<sup>o</sup> 6.

Culture, expences, and produce, of ten perches, field L\*, 1766.

## C U L T U R E.

Yielded wheat in 1765: the piece forms a narrow stretch, and was trench-ploughed in the manner before-mentioned, by two ploughs, with six horses, the beginning of October: before the expiration of the month manured it with two loads of rotten farm-yard dung, which was spread on it, and in that manner left for the winter. The beginning of March ploughed it twice more in the common manner, and harrowed it twice;

on which harrowings threw in the seed, covering it by a third. It was ten weeks before the crop was ready to hoe; the number of weeds not great, but too many to hoe for the first time with large hoes: the work was therefore performed with small ones. The end of June set them out at the proper distance by the second hoeing: the plants were left according to their thickness, from twelve inches to two feet from each other. After this, one more slight hoeing was given, to cut up a few weeds that had arose, and this completed the culture. Dig them up the end of October: the product 11 bushels, or *per acre* 176. Gave them, with the carrots of the preceding experiments, to the same cattle.

## EXPENCES.

£. s. d.

One trench-ploughing,	—	—	—	—	0	2	0
Two common ditto,	—	—	—	—	0	2	0
Three harrowings,	—	—	—	—	0	0	4½
Manuring,	—	—	—	—	0	12	9
Seed,	—	—	—	—	0	5	0
Sowing,	—	—	—	—	0	0	9
First hand-hoeing,	—	—	—	—	0	18	0
Second ditto,	—	—	—	—	0	12	0
Third ditto,	—	—	—	—	0	5	0
Digging up,	—	—	—	—	0	7	0
Carting, topping, &c. &c.	—	—	—	—	0	5	0
					<hr/>		
					2	19	10½
Rent, &c.	—	—	—	—	0	17	0
					<hr/>		
					3	16	10½

## PRODUCE.

£. s. d.

176 bushels, at 1s. 1d.	—	—	—	—	9	10	8
Expences,	—	—	—	—	3	16	10½
					<hr/>		
Profit,	—	—	—	—	5	13	9½
Ploughing,	—	—	—	—	0	9	7
Harrowing,	—	—	—	—	0	1	1½
Manuring,	—	—	—	—	0	10	0
Carting,	—	—	—	—	0	2	2
					<hr/>		
					1	2	10½
					<hr/>		
Clear profit,	—	—	—	—	4	10	11

## OBSERVATIONS.

This soil is evidently much inferior for carrots to my gravelly loam: for with all advantages of manuring, and hoeing with the greatest care, the crops do not half equal those on the lighter soil. Wherever, therefore, a farmer has an opportunity of chusing his soil, let him fix on the gravelly, in preference to the clayey, brick-earth loam.

But although such a superiority lies on the side of the gravel, the other is by no means to be slighted, when a better soil is not possessed. What common crop on this land would yield a produce of nine pounds an acre? I know of none: not one in ten would reach half way. None would return a clear profit of 4*l.* 10*s.* after paying for an ample manuring. A crop of the best turneps would have been attended with some pounds of loss, which is very different from so considerable a profit. I do not think that these soils, wet as they are, without draining, can be applied to a more profitable culture than yielding carrots every year. No common husbandry, in the utmost exertions, will half equal such a system: 4*l.* 10*s.* *per* acre, clear profit, by an ameliorating crop, upon which so much hoeing and a manuring is bestowed, is a very great acquisition, and can appear small only on comparison with the profit of the other soil. It is undoubtedly considerable enough to prove, that the idea of carrots thriving only in sand, or on light soils, is extremely false, and must have been occasioned more by accident than an experimental attention.

EXPERIMENT N<sup>o</sup> 7.

Culture, expences, and produce, of two acres, field H\*, 1766.

## CULTURE.

This piece in 1759 yielded pease; in 1760, wheat; in 1761, turneps; in 1762, barley; in 1763, turneps; in 1764, barley; in 1765, barley, the stubble of which was ploughed up in the trenching manner, with two ploughs and six horses, the latter end of February. I gained a depth of fourteen inches, the soil appearing very fine and light. The 22d of March gave it a common ploughing; and another the middle of April, and harrowed it: the 14th sowed it with 6 lb. of seed, and covered it by another harrowing. The plants came up very well, but quite smothered in a thicket of weeds. It was the 14th of June before I ventured to hoe them: it was done with small hoes; and where the weeds and carrots were close together, they were separated by the hand. After this operation, I found the rain had set many of the weeds again; I therefore harrowed the field over twice in a place: this checked them considerably, but did no harm to the crop. The middle of July hand-hoed them with large

large hoes to the distance of from one to two feet. The crop we found was not quite regular; in some places being thinner than usual: this was the last operation bestowed on them. The plants grew away very finely throughout the season; had large spreading heads of a fine verdure, and carried all the marks of a luxuriant vegetation. Dug them up the 3d of November, and carting them home, cut off their tops, and laid them up as before: the produce 525 bushels. Numbers of them were extremely large and fine; several weighed forty-two ounces; the diameter in the thickest part four inches; were very strait, and all perfectly well tasted. *Monf. du Chateaufieux* speaks of his horse-hoed carrots weighing from 25 to 30 and 33 ounces each, as rather extraordinary; for it was to the astonishment of his gardener. The common method in this trial exceeds that size by far. A few carrots in this crop were nineteen inches in circumference, and from two feet to two feet eight inches long: one was three feet long; all as strait as an arrow.

Respecting the application of this crop, I tried it for a new use, that of feeding my team, instead of corn. They were worked all the winter more than ever I had occasion for before, owing to my felling above four acres of wood: they, notwithstanding, had no oats, (except in long journies) only carrots washed and chopt in pieces, and given them in chaff; nor did they ever go through their work in better heart. I calculated the saving of oats very exactly, and found it amount to the price of 1s. 1d. *per* bushel, for all the carrots they eat. Some were given, but without account, to fifty young pigs that were weaned on them without milk, which is a remarkable circumstance.

	EXPENCES.				£.	s.	d.
One trench-ploughing,	—	—	—	—	0	4	0
Two common earths,	—	—	—	—	0	4	0
Five harrowings,	—	—	—	—	0	1	3
Seed,	—	—	—	—	0	8	0
Sowing,	—	—	—	—	0	1	0
First hoeing,	—	—	—	—	2	0	0
Second ditto,	—	—	—	—	1	0	0
Digging up,	—	—	—	—	1	2	0
Carting, topping, and laying up,	—	—	—	—	0	18	0
					5	18	9
Rent, &c.	—	—	—	—	1	14	0
					7	12	9

PRODUCE.						£.	s.	d.
525 bushel, at 13d.	—	—	—	—	—	28	9	0
Expences,	—	—	—	—	—	7	12	9
Profit, 10l. 8s. 1½d. per acre,	—	—	—	—	—	20	16	3
Ploughing,	—	—	—	—	0	19	2	
Harrowing,	—	—	—	—	0	3	9	
Carting home,	—	—	—	—	0	6	3	
						1	9	2
Clear profit, 9l. 13s. 6½d per acre,	—	—	—	—	—	19	7	1

## OBSERVATIONS.

This crop is a very noble one, and greatly profitable; but it was not nearly equal to what a better conduct would have made it. I committed more faults than one: it should have been well manured; the advantages of which are undoubtedly very great with this crop, and none pays for it better. It should have received the trench-ploughing before winter, which would have exposed the under stratum of earth, brought up by the deep ploughing, to a longer vicissitude of seasons, which would have both pulverized and sweetened it more, and must have improved the crop. Lastly, after these errors were made, the feed should have been harrowed in on the first earth, which would have gained seven weeks in earliness: a matter of great consequence in this crop, as the land broke up very loose, and in good order. This would undoubtedly have been the right conduct; for the intermediate ploughing could not answer the ends of an autumnal one. These errors, upon the whole, were undoubtedly a great deduction from the product of the crop. I calculate, at least, a third.

But with all these disadvantages, it is an extremely profitable one. By what other husbandry should I have converted the fallow year to a clear profit of 9l. 13s. 6d. per acre? The three other years of the course will, taken together, yield no such benefit. There is no doubt but that this crop is much more advantageous than all four in the common course: the profit of the husbandry of carrots cannot, therefore, be doubted.

But whoever undertakes this culture, must, above all other points, attend with the utmost spirit to the cleaning the crop from weeds. These two acres, when I began to hoe them, made an appearance truly formidable. The day I set the men to work, some neighbouring farmers, who had all along treated my carrot-culture with great contempt, coming through

through the field, asked me if I expected a crop here? I replied, "An excellent one." It would have entertained any person to have seen their countenances: they thought me mad; — insisted that I should have nothing but weeds; that there were not three carrots in a yard; with an hundred other assertions of the same kind. I saw the same men afterwards, when the plants had just received the second hoeing, and made a most beautiful appearance, without a weed in the field. I carried them to view the crop, and their astonishment was too great for them to conceal: but it all wore away into the contemplation of the expence they thought I had been at; saying, they were sure every carrot would cost me a crown.

Notwithstanding the immense profit, which undoubtedly attends a crop of carrots, yet the expences are so heavy, that I much question whether one farmer in a thousand will ever be induced to practise it in countries where it is not common. They will think to save something in the expences, by not hoeing in so complete a manner as I have always done, and that conduct will inevitably ruin their crops: they will then attribute their ill success to the fault of the vegetable, and desist from what they will think a most unprofitable culture. But I do not think one common farmer in a thousand would attempt to save a crop that was half so full of weeds as this; for instance, before the hoers went in.

#### EXPERIMENT N<sup>o</sup> 8.

Culture, expences, and produce, of a rood, field R\*, 1767.

#### CULTURE.

This is the rood cropped with carrots in 1766, and which was registered in Experiment N<sup>o</sup> 4. As soon as the carrots were off the ground, I trench-ploughed it with two ploughs and six horses as before, gaining a depth of about fifteen inches, and so left it for the winter. March the 9th, manured it with five loads of rotten farm-yard dung, which was ploughed in the next day, and the land harrowed twice; after which sowed it, and covered the seed by a third harrowing.

The plants came up very well, and regularly; but were not ready to hoe before the second week in May, when they were singled out to the distance of twelve or fourteen inches, by large hoes, the crop being clean enough to admit those instruments the first hoeing. The latter end of June gave a second hoeing, which left the ground as clean as any garden: but a third became necessary, from the frequent showers bringing up a continual progeny of young weeds. This last operation was given the end of August. Dug up the crop in September: produce 132 bushels, or *per acre* 528.

[B b 2]

Respecting



Respecting the application of them, a large quantity was directly given to all my stock of cattle, which were confined from roaming about the farm, on account of the new tenant; horses, cows, fatting oxen, hogs of all sorts, and young cattle: the rest I carried with me into Essex for my horses; and I found by feeding them sometimes on the carrots, that they saved, in oats, at the rate of 1s. 1½d. per bushel, and proved a speedy cure to the distemper which then raged with great violence among them.

## P R O P O R T I O N S.

## E X P E N C E S.

One trench-ploughing,	—	—	—	—	0	2	0
Two common ditto,	—	—	—	—	0	2	0
Three harrowings,	—	—	—	—	0	9	4½
Manuring,	—	—	—	—	0	7	9
Seed,	—	—	—	—	0	5	0
Sowing	—	—	—	—	0	0	9
First hand hoeing,	—	—	—	—	1	0	0
Second ditto,	—	—	—	—	0	10	0
Third ditto,	—	—	—	—	0	5	0
Digging up,	—	—	—	—	1	5	0
Carting, cleaning, topping, and laying up,	—	—	—	—	0	15	0
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Rent,	—	—	—	—	4	12	10½
					0	17	0
<hr/>							
					5	9	10½

## P R O D U C E.

528 bushels, at 1s. 1½d.	—	—	—	—	29	14	0
Expences	—	—	—	—	5	9	10½
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Profit,	—	—	—	—	24	4	1½
Ploughing,	—	—	—	—	0	9	9
Harrowing,	—	—	—	—	0	1	1½
Manuring,	—	—	—	—	0	12	6
Carting,	—	—	—	—	0	7	0
<hr/>							
					1	10	4½
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Clear profit,	—	—	—	—	22	13	9

## O B S E R V A T I O N S.

This is the best crop of carrots I ever had; and I attribute its being so very noble a one to succeeding a crop of carrots, and both being manured. I have sometimes harrowed in the seed on a single spring-ploughing, after a trench-ploughing in autumn, and sometimes even in spring: the crops have been very good, and extremely profitable; but cannot possibly be expected to equal one, which succeeds a manured trench-ploughed carrot crop, and itself manured for. In this culture the ground to the bottom of the staple has been long exposed to the atmosphere, and even mixed with manure from the surface to the bottom. In such a case, the carrots have a body of nothing but mellow, improved soil to strike into; the consequence of which cannot fail of being a great crop: and the vast amount of both product and crop shew how adviseable it is to continue the culture on the same land. Carrots, it is true, prepare excellently for corn: but then what corn will yield a product of thirty pounds an acre? The amount of ten years successive crops will not equal this one of carrots. It is undoubtedly the most profitable article of culture that these gravelly loams can possibly be put to. There are some crops, concerning the immense profit of which several authors have expatiated; such as liquorice, madder, hops, woad, &c. &c. Hops, I well know, do not, on an average of years, equal the profit of carrots; but they would not do on a gravel. Madder I have tried, and it has proved uniformly unprofitable, from my soil being improper. But supposing it equalled, on my land, the products I have read of, the preparation and growth takes four years, at an hundred pounds an acre, the highest sum mentioned by these writers, it is 25*l.* product *per acre per annum*; and as the culture is more expensive than that of carrots, I see not any superiority, but a great inferiority; and I suppose, (as the case generally is with those random assertions) that not one acre in five thousand amounts to 100*l.* With liquorice and woad I am totally unacquainted. Potatoes on a right soil, and great plenty of dung, I believe, exceed carrots; but I have not had equal success with them.

This piece last year yielded a produce of 25*l.* 8*s.* 8*d.* *per acre*, and now 29*l.* 14*s.* 0*d.* I regret infinitely, that I have it not in my power to continue the culture; but leaving the farm, breaks all my views: I have no doubt but it would have continued to yield a crop worth, upon an average, every year, from 20*l.* to 30*l.* *per acre*. I have so strong an idea of the excellencies of this branch of culture, that I shall never cultivate any soil, not absolutely clay, without trying carrots on it; for I have great reason to be confident, that no article of husbandry can make a more profitable return.

I much wish that the common farmers, who have land in various parts of the kingdom, that would do incomparably for them, would try a rood at a time; the expence of which could not hurt them, if it failed, and would take the firm resolution to adhere to directions in every particular; above all, that of not being frightened at the first appearance of the crop, but undertaking the hoeing with unremitting spirit. They would then be at once convinced of the infinite profit of cultivating this vegetable.

### EXPERIMENT N<sup>o</sup> 9.

Culture, expences, and produce, of a rood, field M\*, 1767.

Yielded carrots in 1765 and 1766, registered in Experiments N<sup>o</sup> 2. and 5. After taking up the latter crop, I trench-ploughed the ground with two ploughs and six horses; which work was performed with so much more ease than first ploughings of the same kind, that I gained a depth of 16 inches by it, which exceeded any ploughing in depth that I remember to have given: the land was left thus for the winter. The beginning of March manured it with five loads of rotten farm-yard dung, which were directly turned in by a common ploughing: the land twice harrowed, and the seed sown, being covered by a third harrowing. The plants came up very regularly and well; and what much delighted me, surprisngly free from weeds, on comparison with most of my crops in former years. The plants were very distinct, and greatly more in number than the weeds that surrounded them. The hoeing was an easy matter; the men performing it very well with large hoes, setting them at once from twelve to eighteen inches asunder. The beginning of July hoed them a second time, which operation left the crop as clean as possible: nor did it, throughout the remainder of the season, require more than once looking over, to cut up a few straggling weeds that appeared here and there. Dug up the crop the latter end of September: the product 140 bushels, or *per acre* 560. They were given, like N<sup>o</sup> 8, to many sorts of cattle; and, from one experiment, I tried, by confining a large parcel of hogs of all sorts to them, I found they paid 1s. 1d. *per bushel* in that application.

### PROPORTIONS *per* ACRE.

	EXPENCES.				£. s. d.		
One trench-ploughing,	—	—	—	—	0	2	0
Two common ditto,	—	—	—	—	0	2	0
Three harrowings,	—	—	—	—	0	0	4½
Carried over,	—	—	—	—	0	4	4½

						£.	s.	d.
Brought over,	—	—	—	—	—	0	4	4½
Manuring,	—	—	—	—	—	0	7	9
Seed and Sowing,	—	—	—	—	—	0	5	9
First hand-hoeing,	—	—	—	—	—	0	15	0
Second ditto,	—	—	—	—	—	0	10	0
Third ditto,	—	—	—	—	—	0	4	0
Digging up,	—	—	—	—	—	1	10	0
Carting, cleaning, topping, and laying up,	—	—	—	—	—	1	0	0
						<hr/>		
Rent, &c.	—	—	—	—	—	4	16	10½
						0	17	0
						<hr/>		
						5	13	10½

						£.	s.	d.
P R O D U C E.						<hr/>		
560 bushels, at 1s. 1d.	—	—	—	—	—	30	6	8
Expences,	—	—	—	—	—	5	13	10½
						<hr/>		
Profit,	—	—	—	—	—	24	12	9½
Ploughing,	—	—	—	—	0 9 9			
Harrowing,	—	—	—	—	0 1 1½			
Manuring,	—	—	—	—	0 12 6			
Carting,	—	—	—	—	0 7 0			
					<hr/>	1	10	4½
						<hr/>		
Clear profit,	—	—	—	—	—	23	2	5

## O B S E R V A T I O N S.

I consider this experiment as one of the most valuable I could lay before the public; for it proves clearly, that carrots may be continued, with uncommon profit, three years on the same land: a point which, on many accounts, is of peculiar importance. A man may have only one field proper for this root, and neglect to sow it more than one year in several, under the idea of its not prospering successively on the same land. That this is a mistaken notion is evident: a person whose land was circumstanced in that manner, should undoubtedly determine to sow the field every year with carrots; the benefit of which conduct would be immense. But there is further a very material advantage in cropping land every year with carrots; they improve from the increasing depth of ploughing, and the vast decrease of weeds. Such a very complete hoeing-culture as this crop receives, cleans the land in an high degree; so that every crop becomes cleaner and cleaner, and consequently

frequently less expensive. The present trial proves undeniably, that they improve for three years, and the same cause certainly will continue its increasing influence.

The amazing advantages of this culture are seen in the clearest light, if we consider the profit of above *20l. per acre per annum*, after paying the expences of a rich manuring of twenty loads *per acre*. Land that every year receives such a dressing, and at the same time a deep trench, and much hand-hoeing, and at the same time cropped with an ameliorating vegetable, cannot fail of becoming as rich as the most fertile gardens, and insuring prodigious crops of every thing planted on it. I have not the least doubt of the culture being the surest means to improve land to its utmost capability.

This product of *30l.* for one acre of carrots, is carrying the culture to an higher perfection than ever I expected to see it on my lands; and I cannot but recommend a strict attention to it in other farmers, as they will most assuredly find it an object deserving the greatest application they can give it, and several hundreds *per cent.* more profitable than any common husbandry in the world.

#### GENERAL OBSERVATIONS ON these EXPERIMENTS.

This culture has proved so uncommonly profitable, that the real state of it cannot be set in too clear a light. It is certainly one of the most important objects in modern husbandry, and every person, solicitous about the general prosperity of agriculture, cannot but wish to see it common. No inconsiderable step to it will be to shew the average circumstances of these experiments, which are the beginning of my practice, and consequently may be supposed not so perfect in the conduct as a succeeding course would have been. The value of experience is the ability of avoiding errors, and of chusing from several modes that which is most advantageous.

EXPENCES.				£. s. d.		
N <sup>o</sup> 1,	Expences <i>per acre</i> ,	—	—	4	17	3½
2,	—	—	—	5	10	10½
3,	—	—	—	3	5	6
4,	—	—	—	6	13	0
5,	—	—	—	5	5	1
6,	—	—	—	4	19	9
7,	—	—	—	4	10	11
8,	—	—	—	7	0	3
	—	—	—	7	4	3
				49	6	11

Average, *5l. 9s. 8d.*

All the circumstances of the preceding trials being included, the mean expence is 5*l.* 9*s.* 8*d.* Which sum will not, I think, appear an extravagant one, if it be considered that it includes rent; that the crops are trench-ploughed for;—that the hoeing is performed in so complete a manner, as to leave the land as clean as any garden;—and lastly, that most of the crops were amply manured for. Nor would I recommend this culture to any person, who should be sparing of five guineas *per* acre expence in their culture. This is the grand part of the whole business: in the preparation of the land, and in cleaning the crop, the more you spend, the greater will be your profit. This is a fundamental maxim, which should, on no account, be deviated from. It is certainly a very expensive culture, and those who are apt to reject such, for that reason ought on no account to have any thing to do with carrots. This table of expences may be divided thus:

## M A N U R E D C R O P S.

					<i>l.</i>	<i>s.</i>	<i>d.</i>
N <sup>o</sup> 4,	—	—	—	—	6	13	0
5,	—	—	—	—	5	5	1
6,	—	—	—	—	4	19	9
8,	—	—	—	—	7	0	3
9,	—	—	—	—	7	4	3
					<hr/>		
					31	2	4

Average, 6*l.* 4*s.* 5*d.*

## U N M A N U R E D.

					<i>l.</i>	<i>s.</i>	<i>d.</i>
N <sup>o</sup> 1,	—	—	—	—	4	17	3½
2,	—	—	—	—	5	10	10½
3,	—	—	—	—	3	5	6
7,	—	—	—	—	4	10	11
					<hr/>		
					18	4	7

Average, 4*l.* 11*s.* 2*d.*

The difference of the expence of these methods is trifling, compared to the advantage. Large sums should in this culture be expended on manure, if it is undertaken without that general advantage which all the crops of a farm reap, by turns, from a well-regulated farm-yard, which is the cheapest of all methods of raising manure.

## P R O D U C T.

			Busbels.		£.	s.	d.
N <sup>o</sup> 1, <i>Per acre,</i>	—	—	248	—	12	8	0
2,	—	—	294	—	13	19	6
3,	—	—	136	—	7	1	8
4,	—	—	436	—	25	8	8
5,	—	—	468	—	25	7	0
6,	—	—	176	—	9	10	8
7,	—	—	262	—	14	4	6
8,	—	—	528	—	29	14	0
9,	—	—	560	—	30	6	8
			<u>3108</u>	—	<u>168</u>	<u>0</u>	<u>8</u>
Average,	—	—	<u>345</u>	—	<u>18</u>	<u>13</u>	<u>5</u>

These products are, upon the whole, exceedingly great, and shew, in the clearest manner, the vast quantities which an acre of carrots will yield: 345 bushels, upon an average of nine crops, in value near eighteen guineas, are an amount sufficient, I apprehend, to encourage any man to attempt this most beneficial culture. The table should be divided according to circumstances.

N<sup>o</sup> 3. and 6. are on a clayey loam: the great inferiority of them to the rest shews plainly, that, advantageous as carrots are, on almost all soils, yet the great benefit of them is on dry ones: I shall, therefore, throw those numbers out of the question.

## M A N U R E D C R O P S.

					£.	s.	d.
N <sup>o</sup> 4,	—	—	436	—	25	8	8
5,	—	—	468	—	25	7	0
8,	—	—	528	—	29	14	0
9,	—	—	560	—	30	6	8
			<u>1992</u>	—	<u>110</u>	<u>16</u>	<u>4</u>
Average,	—	—	<u>498</u>	—	<u>27</u>	<u>14</u>	<u>1</u>

## U N M A N U R E D.

			<i>Bushels.</i>		<i>£. s. d.</i>
N <sup>o</sup> 1,	—	—	248	—	12 8 0
2,	—	—	294	—	13 19 6
3,	—	—	262	—	14 4 6
			<hr/> 804	—	<hr/> 40 12 0
Average,	—	—	268	—	13 10 8
Manured,	—	—	498	—	27 14 1
Unmanured,	—	—	268	—	13 10 8
Superiority,	—	—	<hr/> 30	—	<hr/> 14 3 5

This state of the crops demands particular attention. The importance of manuring richly for carrots here appears in the strongest light that is possible. It is true, some part of this superiority is owing to another cause, which will appear presently; but the difference is so great, that I may venture to recommend the practice in the most earnest manner.

The above Table should be further divided as follows :

## S U C C E S S I V E O N E S.

			<i>Bushels.</i>		<i>£. s. d.</i>
N <sup>o</sup> 2,	—	—	294	—	13 19 6
5,	—	—	468	—	25 7 0
9,	—	—	<hr/> 560	—	<hr/> 30 6 8
N <sup>o</sup> 4,	—	—	436	—	25 8 8
8,	—	—	528	—	29 14 0

Perhaps this is the most important light in which these experiments can be viewed. To discover that carrots introduced in a course are extremely profitable, is a matter that should not be slighted: but to find that the same land will produce them for successive years, with increasing profit, until the product amounts to so very considerable a sum, as 30*l.* an acre, brings to light an husbandry, which I will venture to assert was unknown before; and which is to the full as important



as any thing I remember to have read on the subject. Many cultivators may possess small quantities of land proper for this root, which it would suit them extremely to apply to its culture alone, by that means commanding an annual supply of winter food proportioned to the stock their grasses will carry, or for the raising large quantities of manure by fattening or winter-keeping any sort of cattle: there is no sort that carrots are not admirably adapted to.

The profit of sowing land every year with a crop that will produce from 20*l.* to 30*l.* an acre, is so prodigiously great, that a single field may thus be rendered more advantageous than a whole farm; and a small quantity of land enable a farmer to manure a great breadth every year. Of this point, which throughout the whole range of husbandry is so peculiarly important, we cannot but be sensible, if we reflect on the utility of carrots, not only in keeping horses, instead of oats, but also in fattening oxen and hogs, and keeping cows, young cattle, and sows and pigs. No food equals it in all these applications; and the opportunity they give the farmer of keeping large stocks of all sorts, is like the near neighbourhood of a great city, where the best manures are to be had almost for nothing.

## P R O F I T.

				£.	s.	d.
Experiment N <sup>o</sup> 1,	—	—	—	7	10	8½
2,	—	—	—	7	18	7½
3,	—	—	—	3	16	2
4,	—	—	—	18	15	8
5,	—	—	—	20	1	11
6,	—	—	—	4	10	11
7,	—	—	—	9	13	6½
8,	—	—	—	22	13	9
9,	—	—	—	23	2	5
				118	3	8½

Average, 13*l.* 2*s.* 7*d.*

Which sum is very considerable from the nine first crops tried, in which some errors were committed, and two of the trials confessedly on a very inferior soil.

The Table must be divided thus:

C L A Y E Y L O A M.

					£.	s.	d.
N <sup>o</sup> 3,	Profit	—	—	—	3	16	2
6,		—	—	—	4	10	11
					<hr/>	<hr/>	<hr/>
					8	7	1

Average, 4*l.* 3*s.* 6½*d.*

G R A V E L L Y L O A M.

					£.	s.	d.
Experiment N <sup>o</sup> 1,	—	—	—	—	7	10	8½
2,	—	—	—	—	7	18	7½
4,	—	—	—	—	18	15	8
5,	—	—	—	—	20	1	11
7,	—	—	—	—	9	13	6½
8,	—	—	—	—	22	13	9
9,	—	—	—	—	23	2	5
					<hr/>	<hr/>	<hr/>
					109	16	7½

Average, 15*l.* 13*s.* 9½*d.*

These averages shew, sufficiently plain, that the two trials on clayey loam should not rank here. Those on the gravelly must be further divided.

M A N U R E D.

					£.	s.	d.
Experiment N <sup>o</sup> 4,	—	—	—	—	18	15	8
5,	—	—	—	—	20	1	11
8,	—	—	—	—	22	13	9
9,	—	—	—	—	23	2	5
					<hr/>	<hr/>	<hr/>
					84	13	9

Average, 21*l.* 3*s.* 5*d.*

## U N M A N U R E D.

					£.	s.	d.
Experiment N <sup>o</sup> 1,	—	—	—	—	7	10	8½
2,	—	—	—	—	7	18	7½
7,	—	—	—	—	9	13	6½
					25	2	10½
Average, 8½. 7s. 7d.							
Manured,	—	—	—	—	21	3	5
Unmanured,	—	—	—	—	8	7	7
Superiority,	—	—	—	—	12	15	10

This comparison wants no comment: but I cannot help observing, that the superiority is so very great, that in no part of the kingdom with which I am acquainted would dung be a quarter so dear as to make any alteration in the comparison. Supposing the manures all bought, instead of being raised at home, and suppose them ever so expensive, still the products are so very considerable, that the profit, by manuring, will remain immense. The following experiments are successive crops.

					£.	s.	d.
N <sup>o</sup> 2,	—	—	—	—	7	18	7½
5,	—	—	—	—	20	1	11
9,	—	—	—	—	23	2	5
A N D							
N <sup>o</sup> 4,	—	—	—	—	18	15	8
8,	—	—	—	—	22	13	9

From whence appears, the prodigious advantage of continuing them on the same ground.

Supposing the standing annual profit to be 20*l.* an acre, this is certainly a moderate computation: for an annual manuring, and such complete culture as these crops receive, must be perpetual improvers to the soil; so that in a few years it would become a deep, rich, black, garden mould. Now the clear profit of 20*l.* *per* acre is an object of no slight consequence to whoever lives in the country, from the Peer to

to the farmer of a few acres. Two thousand pounds a year profit, from one hundred acres of land, may, in the gross, sound extravagantly to those who have not experience of carrots under a perfect culture; but still the proportion is the same, and that vast profit undoubtedly is to be made by the culture of this root. I have been in no part of this kingdom where I have not seen large tracts of land that would do excellently for carrots;—that promise, at least, as well for them as the best fields of the preceding experiments; thousands of acres are almost every where to be met with that would yield them in great perfection.—I know not of any culture that will equal this in profit, and at the same time have no more of hazard in it. I have never had a single failure;—the seed is very certain, and nothing destroys the young plants but weeds.—The crop depends very little on the seasons; so that if a man determines to do all that depends on himself alone, he ensures success. Suppose he has only twenty acres of carrot land, what an acquisition to be able to make four hundred pounds a year profit by it.

Besides the immediate profit of the crop, the collateral advantages are of the most important kind: the consumption of the carrots enables you to raise a great quantity of valuable manure; at least the double of what the carrot land requires, which I estimate at twenty loads *per* acre. Thus if you have twenty acres of carrots constantly, they will enable you annually to manure twenty other acres, which is an object of consequence. Another circumstance is, the crop cleaning the land so much, at the same time that it enriches it. Let any reader consider the state the land must be in, after yielding three crops of carrots! That is, after having been thrice trench-ploughed, thrice manured, and kept under a perpetual hoeing. Is there in husbandry a surer method of bringing a farm to the true condition of a garden?

## C H A P. III.

## O F P A R S N I P S.

**T**HIS root is much cultivated in France, as food for cattle; but in what method, or on what principles, I am quite ignorant: whether or not any experiments have been made on it in field husbandry in Britain, I am equally ignorant. Much has been written concerning it in books; but our authors have confined themselves to general assertions and instructions, but offered no experiments; consequently their authority is of no account. I began a few trials on it in small, on different soils, to discover if it was promising, that I might have some experience before I ventured on the culture in a large scale. This is a conduct which every one should pursue, whose fortune renders it necessary to shun too great hazards. The following are the trials I executed: had I continued longer on this farm, they would have been more numerous; but, I believe, not much more extensive: for carrots, in advantage, gained on them so much, that they necessarily attracted my chief attention. General reasonings and reflections on these matters appear to me of so little value, that I could not but consider myself as working on unbroken ground, and consequently was obliged to proceed step by step, to gain that experience which books denied me.

EXPERIMENT N<sup>o</sup> I.

Culture, expences, and produce, of ten square perches, field L\*, 1765.

## CULTURE.

This piece yielded barley in 1764; the stubble of which was ploughed up in October with four horses, to turn it in as deep as possible. I could not gain a greater depth than nine inches: after this ploughing, water-furrowed it for the winter. In March stirred it twice more, and gave it a third earth the beginning of April; on which the seed was harrowed in. It was seven weeks before the young plants made any clear appearance; and then I found them so enveloped in weeds, that I was forced to have them cleaned by a man's hoeing them with a small four-inch hoe, crawling along on his knees. The same method I have used in cleaning carrots. The extreme dry weather that succeeded was very favourable to the destruction of the weeds, not many of them growing again. I found it necessary, however, to give a second hoeing the first week in July; but this was performed in the common manner with nine-inch hoes; and not only cleared the land of the remaining weeds, but also set out the parsnips at regular distances, from twelve to eighteen inches asunder. They flourished pretty well after this hoeing, notwithstanding the severity of the drought, which was great. The first week in September another slight hoeing was given, to cut up a few weeds that had escaped before. Dug up the crop in October: the produce six bushels. I gave them to a sow and pigs: she eat them very heartily; but preferred carrots, as I found from giving both together.

From the most attentive observation I could make on the consumption of this crop, and some others I had in a garden, I believe they paid 10*d.* per bushel, — which is as accurately deduced as possible.

## EXPENCES.

					£.	s.	d.
One trench-ploughing,	—	—	—	—	0	2	0
Three common ditto,	—	—	—	—	0	3	0
Harrowing,	—	—	—	—	0	0	4½
Water-furrowing,	—	—	—	—	0	0	6
Seed,	—	—	—	—	0	5	0
Sowing,	—	—	—	—	0	0	9
First hand-hoeing,	—	—	—	—	1	10	0
Second ditto,	—	—	—	—	0	10	0
Third ditto,	—	—	—	—	0	5	0
Carried over,	—	—	—	—	2	16	7½

					£.	s.	d.
Brought over,	—	—	—	—	2	16	7½
Digging up,	—	—	—	—	0	6	6
Topping, cleaning, carting home, and laying up,	—	—	—	—	0	3	9
					3	6	10½
Rent, &c.	—	—	—	—	0	17	0
					4	3	10½

## P R O D U C E.

96 bushels, at 10d.	—	—	—	—	4	0	0
Loss,	—	—	—	—	0	3	10½
Ploughing,	—	—	—	0	5	0	
Harrowing,	—	—	—	0	0	6½	
Carting home,	—	—	—	0	1	6½	
					0	7	1½
Total loss,	—	—	—	—	0	11	0

## O B S E R V A T I O N S.

From the appearance of this crop throughout the season, I hoped it would prove a very profitable one; but when we came to dig up the parsnips, they turned out small and deformed roots; which makes me think, that a drier lighter soil will suit this plant better, as well as carrots. This first trial of parsnips is no great encouragement; however, I shall vary my experiments another year.

E X P E R I M E N T N<sup>o</sup> 2.

Culture, expences, and produce, of ten perches, field M\*, 1766.

Yielded wheat in 1765; the stubble of which was ploughed up in October with six horses and two ploughs, and so left it for the winter: the depth about fourteen inches. The beginning of March stirred it twice; the latter end of which turned in a load and a half of rotten farm-yard dung; and the land being harrowed, the seed was sown the middle of the month, and covered by another harrowing. It was the first week in June before they were ready to hoe, and then so hid in such a thicket of weeds, that the men, who used four-inch hoes, were forced to do the whole work on their knees. In a fortnight after this hoeing, finding that the frequent showers had set many of the weeds, I ordered the ground to be harrowed once, and gave another hoeing with

with common hoes, the middle of July. This work was slightly repeated the last week in August. Dug up the crop in October: the quantity eleven bushels, or *per* acre 176 bushels. They were given, with some other parcels, to lean hogs. I had it not in my power absolutely to ascertain the value; but my minutes make it  $10\frac{1}{2}d.$  *per* bushel.

## EXPENCES.

						£.	s.	d.
Trench-ploughing,	—	—	—	—	—	0	2	0
Three common ditto,	—	—	—	—	—	0	3	0
Harrowing,	—	—	—	—	—	0	0	4 $\frac{1}{2}$
Seed,	—	—	—	—	—	0	6	0
Sowing,	—	—	—	—	—	0	0	9
Manuring,	—	—	—	—	—	0	8	9
Three hand-hoeings,	—	—	—	—	—	2	7	0
Digging up,	—	—	—	—	—	0	9	0
Carting home, cleaning, topping, &c.	—	—	—	—	—	0	7	0
Rent, &c.	—	—	—	—	—	4	3	10 $\frac{1}{2}$
						0	17	0
						5	0	10 $\frac{1}{2}$

## PRODUCE.

						£.	s.	d.
176 bushels, at $10\frac{1}{2}d.$	—	—	—	—	—	7	6	8
Expences,	—	—	—	—	—	5	0	10 $\frac{1}{2}$
Profit,	—	—	—	—	—	2	5	
Ploughing,	—	—	—	—	0 11 11 $\frac{1}{2}$			
Harrowing,	—	—	—	—	0 1 1 $\frac{1}{2}$			
Manuring,	—	—	—	—	0 15 0			
Carting home,	—	—	—	—	0 2 6			
						1	10	7 $\frac{1}{2}$
Clear profit,	—	—	—	—	—	0	15	2 $\frac{1}{2}$

## OBSERVATIONS.

As an ameliorating crop, which pays large expences, at the same time that it improves the land, this profit is by no means to be despised. If we compare it, for instance, to turneps, we shall find it far more advantageous. Turneps would be attended with a vast loss, if half this manuring, and hoeing, and trench-ploughing, were charged to their account; and yet all those operations are of very great benefit to the



land, and ought certainly to be calculated as so much gain by the crop. But on the contrary, the same culture would for carrots have produced a crop, perhaps, ten times as beneficial, at least, if I may judge from those which I have taken upon the same soil.

EXPERIMENT N<sup>o</sup> 3.

In March 1766, dug three square perches of ground in field L\*, two feet deep, mixing a large quantity of dung with the upper spit; about the proportion of thirty loads an acre: raked in parsnip feed. The plants were kept perfectly clean throughout the season, and were dug up in November: the produce seven bushels and a half, or *per* acre 400. The crop would be profitable in large, but carrots would have been much more so.

EXPERIMENT N<sup>o</sup> 4.

Culture, expences, and produce, of ten perches, field M\*, 1767.

## CULTURE.

Yielded wheat in 1766; ploughed up the stubble in October, with two ploughs and six horses, to the depth of fifteen inches; in which manner it was left for the winter. In March stirred it again, and manured it with a load and a half of rotten farm-yard dung. The beginning of April turned it in by another earth; and harrowing it, sowed the parsnip feed, covering it by another harrowing. Hand-hoed it, with small hoes, the first week in June, and again with large ones the beginning of August. The men went over them once afterwards, to cut up the weeds that had been left. Dug up the roots the beginning of October: produce nine bushels, or *per* acre 144. Gave them to the hogs; the minuted valued 10d. *per* bushel.

EXPENCES.					£.	s.	d.
Trench-ploughing,	—	—	—	—	0	2	0
Three common ditto,	—	—	—	—	0	3	0
Manuring,	—	—	—	—	0	8	9
Seed and Sowing,	—	—	—	—	0	7	0
Hand-hoeing,	—	—	—	—	2	10	0
Digging up,	—	—	—	—	0	7	6
Carting, cleaning, &c.	—	—	—	—	0	6	0
					4	4	3
Rent, &c.	—	—	—	—	0	17	0
					5	1	3
					PRO-		

P R O D U C E.					£. s. d.
144 bushels, at 10d.	—	—	—	—	6 0 0
Expences,	—	—	—	—	5 1 3
Profit,	—	—	—	—	0 18 9
Ploughing,	—	—	—	0 12 2½	
Harrowing,	—	—	—	0 1 1½	
Manuring,	—	—	—	0 15 0	
Carting	—	—	—	0 2 2½	
				—	1 10 6
The above profit,	—	—	—	—	0 18 9
Loss,	—	—	—	—	0 11 9

## O B S E R V A T I O N S.

This trial is, upon the whole, very unsuccessful, which (considering the culture bestowed) much surprises me: not that I would be understood to think the advantages of such a fallow as this, so ploughed, manured, and hoed, dearly purchased at the price of 11s. 9d. *per acre*. On the contrary, every person must be sensible that it is a cheap fallow; but when other roots are remembered, equally advantageous in that respect, and in others infinitely more beneficial, the comparison turns totally against them.

## G E N E R A L O B S E R V A T I O N S.

I cannot but apprehend that parsnips may be cultivated to much greater profit than has attended them on my soil. From the most accurate remarks I could make on the progress of the crops, I do not think that either the clayey or the gravelly loam agrees with them. The roots have very seldom answered the appearance of the tops, nor ever came to a very large size, although I have, in the same management, had carrots of an enormous size; but either these soils are improper for parsnips, or the crops cannot be comparable to carrots: the latter I cannot but prefer infinitely, — and do verily believe, that parsnips will on no soils equal them; but this I cannot experimentally assert. I shall, however, venture to recommend to all, to give the first attention to carrots, and not to substitute parsnips till the soil is found evidently improper for the former.

Cattle of all sorts, on both roots being laid before them, eagerly prefer carrots.

## C H A P. IV.

## O F P O T A T O E S.

WHEN I began this culture, I had never seen it in the fields; consequently I did not practice it at once in large; and knowing very little of the nature of the plant, I was forced to try a great number of experiments, to gain a clear idea of some points, which I thought it requisite to be certain of. I shall here register but a few of those trials, as the compass of this work will not allow me to be particular on every object. Those which I shall extract from my register will explain, pretty accurately, the nature of this culture on my soils:—a complete treatise I pretend to in no article; for as I speak merely from experience, I can be no more diffusive than my soils allow me. I shall arrange my trials under the following heads:

- I. Culture and Produce in the common method.
- II. Culture and Produce horse-hoed.
- III. Comparison.

These divisions are so distinct, that they are absolutely necessary, notwithstanding the trials I shall insert are but few in number.

## S E C T. I.

## Of the CULTURE of POTATOES in the common Method.

PERHAPS it would be a more proper expression to call it the promiscuous method; for planting in rows is common: but the culture by *horse-hoeing* is the grand distinction between the old and new husbandry in the culture of potatoes. I should remark, that potatoes are never cultivated in this country by farmers, either for cattle or sale. The root is known only in gardens.

EXPERIMENT N<sup>o</sup> I.

Culture, expences, and produce, of half a rood, field L<sup>a</sup>, 1764.

## CULTURE.

Fallowed in 1763, receiving four ploughings and three harrowings; the last earth threw it on to ridge for winter. In March ploughed it again, on which I spread three loads of rotten farm-yard dung; and turning them in by the fifth ploughing, harrowed it, and dibbled in the potatoes. The method used was to strike the hole promiscuously, about twelve inches asunder, which was performed by a man, and a boy following him with the potatoe slices, dropt one into each hole. In this manner three bushels and a half planted this half rood, which is the proportion of twenty-eight bushels *per* acre. As soon as the work was done, the land was harrowed twice in a place. The plants did not appear until the end of May: as soon as they were above ground, the whole surface was thoroughly hand-hoed with eight-inch hoes.

This operation was repeated in June, and again the beginning of July which was all the culture bestowed on them. They were ploughed up in October: the produce seventeen bushels, or *per acre* 136.

### PROPORTIONS *per Acre.*

EXPENCES.					£.	s.	d.
Five ploughings,	—	—	—	—	0	5	0
Three harrowings,	—	—	—	—	0	0	4½
Manuring,	—	—	—	—	0	9	6
28 bushels of potatoes for seed, at 20 <i>d.</i>	—	—	—	—	2	6	8
Dibbling,	—	—	—	—	0	12	0
Hand-hoeing three times,	—	—	—	—	0	15	0
Two ploughings to take up the crop,	—	—	—	—	0	2	0
Picking up the potatoes,*	—	—	—	—	0	4	0
					<hr/>		
Rent, &c.	—	—	—	—	4	14	6½
					1	14	0
					<hr/>		
					6	8	6½
					<hr/>		

PRODUCE.					£.	s.	d.
136 bushels, at 18 <i>d.</i>	—	—	—	—	10	4	0
Expences,	—	—	—	—	6	8	6½
					<hr/>		
Profit,	—	—	—	—	3	15	5½
Ploughing,	—	—	—	0 10 6			
Harrowing,	—	—	—	0 0 9			
Manuring,	—	—	—	0 5 0			
					<hr/>		
					0	16	3
					<hr/>		
Clear profit,	—	—	—	—	2	19	2½

### OBSERVATIONS.

This crop should be viewed in two lights: first, that of the mere amount of the profit; and secondly, that of a preparation for corn. As a mere crop for profit, the balance of the account is not to be despised, three pounds an acre being much more than most corn crops pay; and this clear profit, after the expence of a year's fallow and a manuring being

\* Nothing is charged for carting home, laying up, &c. as the product is valued at the price sold for in the field.

being charged considerable. In the light of a fallow crop, potatoes in these circumstances appear to a very great advantage: for when such crops pay the expence of keeping the land clean, the farmer is generally contented, and looks not for profit. This piece, indeed, received a fallow; but that I take to be improper husbandry: they should certainly be made the fallow. So much hoeing as they receive, renders them excellently adapted for preparing for corn, and is the use I purpose in future to make of them.

Respecting the price at which this crop is charged, I should remark, that I sold a part of them at that rate, and could have sold the whole so. Potatoes yielded, in general, 20*d.* a bushel; but these were not a prime sample. Now it should be observed, that in this point of valuing the crops of potatoes, there is a difficulty, which I know not how clearly to get over. If a man cultivates but a few acres, I apprehend he would have no difficulty in disposing of them at the market price. But suppose he has forty or fifty acres? Now in that case he would find no market for them, and must consequently consume them at home by his cattle; in which application he would have to discover the value of the crop in that manner from particular experiment. But this is relative to my particular situation: for, from the best information I have gained, I find that potatoes yield a large price in most parts of the kingdom; a much larger than I have charged in this trial, and to be gained for any quantities. The method, therefore, which, I think, will most conduce to render these trials of the most extensive utility, will be to charge the crops at the market price at which I sell; and as to the particular price I make, by feeding cattle, to minute it as a collateral circumstance. In this experiment I may observe, that I used some for hogs; and from the consumption, I could not calculate the value at more than 10½*d.* a bushel.

#### EXPERIMENT N<sup>o</sup> 2.

Culture, expences, and produce, of half a rood, field M\*, 1764.

#### CULTURE.

This piece yielded oats in 1763; the stubble of which was ploughed up in October. The beginning of March stirred it twice more; the last of which turned in three loads of rotten dung: harrowed the land twice; and the 21<sup>st</sup>, &c. dibbled in the sets at about one foot distance, and covered them by harrowing. Used three bushels of potatoes. They came up the middle of May; and as soon as most of them were to be seen, they were hand-hoed carefully with nine-inch hoes. About the end of June gave them another hand-hoeing. In August they were

hand-weeded; ploughed up in October. Produce twenty-three bushels, or *per* acre 184.

EXPENCES.					£.	s.	d.
Three ploughings,	—	—	—	—	0	3	0
Harrowing,	—	—	—	—	0	0	6
Manuring,	—	—	—	—	0	9	6
24 bushels of potatoes, at 20 <i>d.</i>	—	—	—	—	2	0	0
Dibbling,	—	—	—	—	0	13	6
Hand-hoeing twice,	—	—	—	—	0	13	0
Weeding,	—	—	—	—	0	2	6
Two ploughings to take up the crop,	—	—	—	—	0	2	0
Picking up,	—	—	—	—	0	6	0
					<hr/>		
					4	10	0
Rent, &c.	—	—	—	—	0	17	0
					<hr/>		
					5	7	0

PRODUCE.					£.	s.	d.
184 bushels, at 1 <i>s.</i> 6 <i>d.</i>	—	—	—	—	13	16	0
Expences,	—	—	—	—	5	7	0
					<hr/>		
Profit,	—	—	—	—	8	9	0
Ploughing,	—	—	—	0 4 6			
Harrowing,	—	—	—	0 1 0			
Manuring,	—	—	—	0 5 0			
					<hr/>		
					0	10	6
Clear profit,	—	—	—	—	<hr/>		
					7	18	6

## OBSERVATIONS.

This profit is considerable, and much beyond any that common husbandry would have given. This piece of land, according to the usual maxims, should either have been sown for another crop of oats, or turneps. The first would by no means have equalled this of potatoes, besides not being generally allowed to be good husbandry — that of sowing two crops of oats together. The *product* would not near have equalled the *clear profit* of these potatoes. Sowing the field with turneps would have been much better husbandry; but nothing comparable to this of potatoes. They would probably have been a losing crop, purchased for the sake of cleaning the

the land, and preparing for corn: but this crop of potatoes is more profitable than any of corn, though it prepares for wheat, as well as turneps can possibly do for barley; and, in my opinion, far better. The manuring equals that for turneps:—the hoeing much exceeds:—the shade of the crop is thicker, and lasts for a longer time:—and the taking up the crop prepares so directly for wheat, that nothing remains to do, but to sow and harrow in the seed. Advantages much superior to any which attend the turnep culture: but the single circumstance of the amount of the profit is sufficient to decide such a matter. The clear profit from this crop much exceeds that of any one of corn in our courses;—nay of any two,—unless the husbandry is more perfect and spirited than what is generally known here.

EXPERIMENT N<sup>o</sup> 3.

Culture, expences, and produce, of a rood, field L\*, 1765.

## CULTURE.

Yielded oats in 1764; the stubble of which was ploughed up in November. The beginning of March stirred it for the first time in the spring, and on that earth spread seven loads of rotten farm-yard dung: ploughed in the dung the last week of the month; and harrowing the land smooth, dibbled in five bushels of potatoes cut in slices, promiscuously, about one foot asunder, and covered them by another harrowing. They did not come up till the end of May, and the weather turning out remarkably dry, they made no great appearance for some time: hand-hoed them thoroughly as soon as they were visible. In July this operation was repeated; but the summer was so extreme a drought, that the plants came on poorly. In August I gave them another hand-hoeing, which finished the culture. They were ploughed up in October, and I was very much surprised to find the roots much better than the tops indicated. The produce amounted to twenty-seven bushels.

EXPENCES						£.	s.	d.
Three ploughings,	—	—	—	—	—	0	3	0
Harrowing,	—	—	—	—	—	0	0	4½
Manuring,	—	—	—	—	—	0	12	0
20 bushels of potatoes,	—	—	—	—	—	2	0	0
Slicing,	—	—	—	—	—	0	2	6
Dibbling,	—	—	—	—	—	0	14	0
Hand-hoeing thrice,	—	—	—	—	—	0	17	6
Carried over,	—	—	—	—	—	4	9	4½



					£.	s.	d.
Brought over,	—	—	—	—	4	9	4½
Two ploughings to take up,	—	—	—	—	0	2	0
Picking up the crop,	—	—	—	—	0	5	6
					4	16	10½
Rent,	—	—	—	—	0	17	0
					5	13	10½

						£.	s.	d.
PRODUCE.								
108 bushels, at 2s.	—	—	—	—	10	16	0	
Expences,	—	—	—	—	5	13	10½	
Profit,	—	—	—	—	5	2	1½	
Ploughing,	—	—	—	—	0	5	0	
Harrowing,	—	—	—	—	0	0	6½	
Manuring,	—	—	—	—	0	10	6	
					0	16	0½	
Clear profit,	—	—	—	—	4	6	0½	

## OBSERVATIONS.

The circumstance of potatoes being an ameliorating crop, and preparing the land to the full as well as a fallow for wheat, should never be forgotten, when the profit of them is considered. Four pounds six shillings *per* acre clear, after paying a manuring, and in a season which I take to have been very unfavourable to them, are not, upon the whole, a trifling advantage:—compared with the crops of common husbandry, it is very high.

I kept a minute of the application of these potatoes: they paid me 11d. *per* bushel in feeding hogs and pigs. This is not half the selling price; so that those who cultivate them for cattle alone, should calculate on different data from what I have done. But let me observe, that if the crops are expended at home, there will be a profit arise in the article of manure by no means inconsiderable.

EXPERIMENT N<sup>o</sup> 4.

Culture, expences, and produce, of half an acre, field L\*, 1766.

## CULTURE.

Yielded oats in 1765: the stubble ploughed up in October. Stirred it again the first week in March, and manured it with twelve loads of rotten farm-yard dung: ploughed it again, and harrowed it the 13th; and then dibbled in the slices, using ten bushels of potatoes, and covering them with the harrow. Hand-hoed the ground all over the latter end of April. This, I was informed, was the practice near London. It is undoubtedly an excellent one, destroying all the weeds, and loosening the surface of the earth; so that the young plants come up not only strong, but free from enemies. They appeared the middle of May. In June hand-hoed them, and again in July, which was all the culture they received. Ploughed up the latter end of October. Produce ninety-seven bushels.

## EXPENCES.

					£.	s.	d.
Three ploughings,	—	—	—	—	0	3	0
Harrowing,	—	—	—	—	0	0	4½
Manuring,	—	—	—	—	0	9	6
Seed,	—	—	—	—	2	0	0
Planting and slicing,	—	—	—	—	0	17	0
Three hand-hoings,	—	—	—	—	0	14	0
Ploughing and taking up,	—	—	—	—	0	8	0
					<hr/>		
Rent, &c.	—	—	—	—	4	11	10½
					0	17	0
					<hr/>		
					5	8	10½

## PRODUCE.

	P R O D U C E .				£.	s.	d.
194 bushels, at 20d.	—	—	—	—	16	3	2
Expences,	—	—	—	—	5	8	10½
					<hr/>		
Profit,	—	—	—	—	10	14	3½
Ploughing,	—	—	—	—	0	11	11¼
Harrowing,	—	—	—	—	0	1	1½
Manuring,	—	—	—	—	0	15	0
					<hr/>		
					1	8	1½
					<hr/>		
Clear profit,	—	—	—	—	9	6	2¼
					<hr/>		

O B S E R -

## O B S E R V A T I O N S.

This is a very considerable profit, and vastly more than is ever gained from any common husbandry. Scarcely one crop in forty of wheat yields so great a *produce* as this clear *profit*, which, with the circumstance of *improving*, instead of *exhausting* the land, make it a most important culture, and one which I cannot but recommend to all farmers, who are desirous of gaining profitable crops, at the same time that they keep their land clean, and in excellent heart. Wheat succeeds them to the greatest advantage, and thrives, after this preparation, much better than after a fallow. This will not appear wonderful, if the manuring is considered, and the subsequent hoeings, which totally destroy all the weeds; and I leave to the reader to reflect on the vast difference between a fallow, which costs much money, and a fallow crop that yields nine pounds profit.

Part of this crop I sold; the rest paid me, by feeding hogs,  $10\frac{1}{2}d.$  per bushel.

E X P E R I M E N T N<sup>o</sup> 5.

Culture, expences, and produce, of half a rood, field L\*, 1766.

## C U L T U R E.

Yielded barley in 1765; the stubble of which was ploughed up in October, turning in three loads of rotten dung, and the land water-furrowed. The first week in March manured it with five loads more of rotten farm-yard dung; ploughed it in directly: the week following ploughed it twice more, and harrowed it thrice. It was in remarkable fine order: the 15th planted it with ten pecks of potatoes sliced; dibbled them in promiscuously about one foot asunder, and covered them by an harrowing. The first week in May hand-hoed the whole surface, leaving it perfectly clean, and quite free from weeds. It was a fortnight after before all the potatoes were up. The first week in July hand-hoed them very carefully; — again the beginning of August, and once more before the end of the month. The crop was extremely luxuriant, and made a fine appearance. Ploughed it up the latter end of October; but from the number of potatoes, it took three ploughings to clear the soil of them. Produce 40 bushels, or *per* acre 320.

## E X P E N C E S.

					£.	s.	d.
Four ploughings,	—	—	—	—	0	4	0
Harrowing,	—	—	—	—	0	0	6
Twice manuring,	—	—	—	—	2	2	0
Carried over,	—	—	—	—	2	6	6

					£.	s.	d.
Brought over,	—	—	—	—	2	6	6
Seed,	—	—	—	—	2	0	0
Slicing and planting,	—	—	—	—	0	18	0
Four hand-hoeings,	—	—	—	—	1	4	0
Ploughing and taking up,	—	—	—	—	0	13	0
					<hr/>		
Rent, &c.	—	—	—	—	7	1	6
					0	17	0
					<hr/>		
					7	18	6
					<hr/>		

						£.	s.	d.
P R O D U C E.								
320 bushels, at 20d.	—	—	—	—	26	13	2	
Expences,	—	—	—	—	7	18	6	
					<hr/>			
Profit,	—	—	—	—	18	14	8	
Ploughing,	—	—	—	0 16 9½				
Harrowing,	—	—	—	0 1 6				
Manuring,	—	—	—	2 0 0				
					<hr/>			
					2	18	3½	
					<hr/>			
Clear profit,	—	—	—	—	15	16	4½	
					<hr/>			

## O B S E R V A T I O N S.

This is a very considerable profit, and proves (in the clearest light) the great importance of the potatoe culture, when the land is naturally or artificially extremely rich. The quantity of manure bestowed on this piece (64 loads *per* acre) is very great; but the crop we find is proportioned, and after paying that and other very heavy expences, leaves a clear profit of fifteen guineas, which, from one acre, I think a very considerable sum. It is to be remembered, that this profit is on a crop that, from its own nature, the rich manuring, and the excellent culture of hoeing and ploughing, leaves the land infinitely better than it found it; infomuch that it is fit for any crop that requires the soil to be in the highest degree of perfection. I have not ventured wheat on this land, as it is undoubtedly too rich for that grain: — it would, if the season turned out wet, be laid before harvest, and consequently spoiled. Great profit, arising from crops that keep the land in a constant state of increasing fertility, are the *ne plus ultra* of farming: they tend to bring a whole country to the perfect culture of a garden.

EXPERIMENT N<sup>o</sup> 6.

Culture, expences, and produce, of half a rood, field M\*, 1767.

## CULTURE.

Yielded barley in the utmost perfection of tillage and manure in 1766: the stubble ploughed up in October. The first week in March ploughed it for the second time, and manured it with three loads of rotten farm-yard dung: turned this in by a third ploughing; and harrowing the land smooth, planted it with ten pecks of potatoes sliced, and covered them by another harrowing. The end of April hoed over the ground, and the young plants the end of May. Repeated this operation in June, and again slightly in July. Ploughed them up in October: produce forty-four bushels.

## EXPENCES.

	£.	s.	d.
Three ploughings, — — — — —	0	3	0
Harrowing, — — — — —	0	0	4½
Manuring, — — — — —	0	8	6
Seed, — — — — —	2	0	0
Slicing and planting, — — — — —	0	17	6
Four hand-hoeings, — — — — —	1	0	0
Ploughing and taking up, — — — — —	0	12	0
	<hr/>		
Rent, &c. — — — — —	5	1	4½
	0	17	0
	<hr/>		
	5	18	4½

## PRODUCE.

	£.	s.	d.
352 bushels, at 20d. — — — — —	29	6	4
Expences, — — — — —	5	18	4½
	<hr/>		
Profit, — — — — —	23	7	11½
Ploughing, — — — — —	0	12	2½
Harrowing, — — — — —	0	1	1½
Manuring, — — — — —	0	15	0
	<hr/>		
	1	8	3½
Clear profit, — — — — —	21	19	7½

## O B S E R V A T I O N S

This profit, I think, should open the eyes of our farmers to the real merit of the potatoe culture. Twenty guineas an acre, clear profit, from a crop that is of the most ameliorating nature, and leaves the ground in a far better state than it found it, is very different from any thing in the farmers husbandry. It certainly equals, in profit, seven crops of wheat: for it is not many of them that *clears* 3*l.* *per* acre. This is a fresh proof, that a few acres, perfectly cultivated, exceed, in advantage, several hundreds, applied as this country generally is. But the circumstances of this experiment prove at the same time, that to gain such large crops of potatoes, it is absolutely necessary to have the land in excellent heart. These succeeded a crop in the perfection of culture and tillage, and were besides well manured for: nor did I trust to such funds of fertility alone, but spared no expence in keeping the plants as clean as possible. Under such a culture, with that great degree of putrid fermentation bred by the thickness of such shade throughout summer, the land improves in a wonderful degree, and is ready, after the potatoes, for any crop that requires it in the greatest heart.

## G E N E R A L O B S E R V A T I O N S O N T H E S E E X P E R I M E N T S.

I have been more than once informed, that potatoes have been raised to 100*l.* *per* acre in the neighbourhood of London, and that over whole fields: now my products speak no such capability in the plant, though some of the experiments had very great advantages. This difference may, perhaps, be owing to several causes. Rich as my land has been made by manuring for several years, yet it certainly varies much from that black, crumbly, moist state, the *putre solum*, which whole centuries of manuring have brought some fields around London to. Such a true black mould cannot, I apprehend, be formed in four or five years. Another point is the price of the crop: such great ones may probably have been gained when the London markets were high. Had I staid longer on this farm, I should have tried various experiments on potatoes, in plots of the greatest richness I could form, and see to what a height it was possible (artificially) to carry the culture. The following little table will shew the particulars of the preceding experiments in one view.

## EXPENCES.

				£.	s.	d.
Experiment N <sup>o</sup> 1,	—	—	—	7	4	9½
2,	—	—	—	5	17	6
3,	—	—	—	6	9	11½
4,	—	—	—	6	16	11½
5,	—	—	—	10	16	9½
6,	—	—	—	7	6	8½
				<u>44</u>	<u>12</u>	<u>8</u>

Average, 7*l.* 8*s.* 9½*d.*

## P R O D U C E.

			Buskels.		£.	s.	d.
Experiment N <sup>o</sup> 1,	—	—	136	—	10	4	0
2,	—	—	184	—	13	16	0
3,	—	—	108	—	10	16	0
4,	—	—	194	—	16	3	2
5,	—	—	320	—	26	13	2
6,	—	—	352	—	29	6	4
			<u>1294</u>	—	<u>106</u>	<u>18</u>	<u>8</u>
Average,	—	—	<u>215</u>	—	<u>17</u>	<u>16</u>	<u>5</u>

## P R O F I T.

			£.	s.	d.
Experiment N <sup>o</sup> 1,	—	—	2	19	2½
2,	—	—	7	18	6
3,	—	—	4	6	0½
4,	—	—	9	6	2½
5,	—	—	15	16	4½
6,	—	—	21	19	7½
			<u>62</u>	<u>6</u>	<u>0</u>

Average, 10*l.* 7*s.* 8*d.*

N<sup>o</sup> 5. and 6. which so much exceed the rest, received a better preparation : one manured for at an extraordinary rate ; and the other, besides a common manuring, followed a crop in perfect culture. The great return yielded

yielded by such good husbandry shews plainly, that potatoes require as complete management as most crops, and that few can pay for it better.

The general average profits of 10*l.* *per* acre much exceeds what is ever reaped from any common crops. The farmers in this neighbourhood think themselves very well off, if they get wheat crops worth six or seven pounds *per* acre. The average of the whole country does not rise to 5*l.* and these products are gained by the exertion of their best husbandry. The crop is a very exhausting one, and requires either a fallow to succeed, or yields but a poor one of barley, or a middling one of oats. Now, what comparison is there between such husbandry and this of potatoes, which yield 10*l.* an acre clear profit, at the same time that the land is under a continual improvement? I will venture to assert, that let the soil be ever so exhausted, and full of weeds, this management will, in one year, perfectly clean and ameliorate it: advantages, with 10*l.* *per* acre profit, that are hardly to be expected in any other husbandry: that of the common farmers of wheat, barley, &c. bears no comparison with it.



## S E C T. II.

Of the CULTURE and PRODUCE of POTATOES in the  
New Method.

**T**HIS root is among the plants, which the advocates for the new husbandry assert to be far better cultivated with the horse-hoe than in the common system. Such opinions can never be decided by reason alone; experiment only can determine.

E X P E R I M E N T N<sup>o</sup> 1.

Culture, expences, and produce, of half a rood, field L\*, 1764.

## C U L T U R E.

Fallowed in the year 1763, and ridged up for the winter: reversed the ridges the beginning of March: they were common three-feet ones. The 20th drew them into barks; this is half ploughing the ridges, and laying the sets along the furrows, so as to come up in single rows along the tops of the ridges. Used six pecks: finished the ploughing, which buried them, and left the land in the same form as before. They appeared about the middle of May. The first week in June horse-hoed them for the first time, drawing the ridges again into barks; that is, turning a furrow from the rows on each side, and leaving them on a narrow slip of land. Hand-hoed this slip, cutting the earth between the plants, which stood about one foot asunder. The latter end of the month repeated the horse-hoeing, throwing the moulds back again. Horse-hoed twice  
1
more

more in July, each time contrary to the former, and leaving the ridges at last in their first form: also gave another hand-hoeing to the rows, weeding them at the same time, which completed the culture. The potatoes flourished very well throughout the season, making a neat and husband-like appearance. They were ploughed up the middle of October: the produce 13 bushels, or *per acre* 104.

EXPENCES.					£.	s.	d.
Nine ploughings,	—	—	—	—	0	9	0
Harrowing,	—	—	—	—	0	0	4½
Water-furrowing,	—	—	—	—	0	0	3
Seed, 12 bushels, at 20 <i>d.</i>	—	—	—	—	1	0	0
Slicing and dropping,	—	—	—	—	0	4	6
Four horse-hoeings,	—	—	—	—	0	4	0
Two hand-hoeings,	—	—	—	—	0	3	6
Once ploughing and picking up,	—	—	—	—	0	3	6
					<hr/>		
					2	5	1½
Rent, &c.	—	—	—	—	1	14	0
					<hr/>		
					3	19	1½

PRODUCE.					£.	s.	d.
104 bushels, at 1 <i>s.</i> 6 <i>d.</i>	—	—	—	—	7	16	0
Expences,	—	—	—	—	3	19	1½
					<hr/>		
Profit,	—	—	—	—	3	16	10½
Ploughing,	—	—	—	0 15 0			
Harrowing,	—	—	—	0 0 9			
Horse-hoeing,	—	—	—	0 2 8			
					<hr/>		
					0	18	5
Clear profit,	—	—	—	—	2	18	5½

## OBSERVATIONS.

This trial leaves me very much in doubt concerning the expediency of applying the horse-hoeing culture to potatoes. Here is a year's fallow previous to the crop, and yet the profit is inconsiderable: 2*l.* 18*s.* 5*d.* might probably have been gained by any common, and much less troublesome crop. But then on the other hand, it is to be considered, that the horse-hoeing culture of the potatoes has kept the land in most  
excellent

excellent order, in fine tilth, and perfectly free from weeds; so that the potatoe year has been, in fact, a continuation of the fallow, and the advantages of the culture consequently in the land, and ready to be reaped by the next crop. Besides which, it may, perhaps, be further urged, that to fallow land for potatoes is bad husbandry: they should be made the fallow, instead of being charged with two years rent, and the expences of a year's tillage. For these reasons the experiment is not decisive: we must discover what profit will attend the crops when they are made a fallow to prepare for corn.

#### EXPERIMENT N<sup>o</sup> 2.

Culture, expences, and produce, of half a rood, field M<sup>a</sup>, 1765.

#### CULTURE.

This piece yielded barley in 1764; the stubble of which was ploughed on to two five-foot ridges in October. Reversed them the beginning of March, and spread three loads of rotten farm-yard dung on them. The latter end of the month turned it in by arching up the ridges, and dibbled in a double row of potatoes one foot asunder; and the plants a foot from each other in the rows, and covered them by an harrowing. The beginning of May hand-hoed the crowns of the ridges, to cut up the weeds that grew on them, and broke the clods, leaving the land fine and clean. The potatoes came up the end of that month. The first week in June horse-hoed the ridges, by turning a furrow from the rows on each side, and throwing up a small ridge in the middle of each interval. The season was uncommonly dry: this operation must, therefore, be of very great utility to the plants, in pulverizing the earth, and bringing it into a proper state to imbibe the dews. Hand-hoed the plants after it, loosening the earth, so that they grew out of a fine bed of mould. Repeated the horse-hoeing before the end of the month, throwing the earth back again to the plants; and twice repeated it in July, each time the contrary of the former, and leaving the ridges, at last, in their first position. But I should here remark, that there were some difficulties in executing the horse-hoeings, which, in a more growing year, must, I apprehend, occasion an extraordinary expence. It is the trailing and falling of the stalks into the furrows of the horse-hoeing. Many of these will fall in such a manner, that the succeeding horse-hoeings must either tear them off the plants, or bury them; and as I take such violence to damage all plants, it is requisite, if you would avoid it, to have them turned up, and laid with the rest along the top of the ridge: children can do it as well as men. I took the precaution with this crop, and found from it, that the expence *per acre* would be 1s. 4d.

But

But this must vary with every crop. This year was so remarkable a drought, that the stalks had not near the luxuriance that is to be expected in others. Ploughed it up the middle of October: Produce 16 bushels, or *per acre* 128.

EXPENCES.					£.	s.	d.
Three ploughings,	—	—	—	—	0	3	0
Harrowing,	—	—	—	—	0	0	3
Manuring,	—	—	—	—	0	12	6
14 bushels of feed,	—	—	—	—	1	8	0
Slicing and dibbling,	—	—	—	—	0	12	0
Four horse-hoeings,	—	—	—	—	0	2	8
Two hand-hoeings,	—	—	—	—	0	5	6
Clearing the furrows of the stalks,	—	—	—	—	0	1	4
Ploughing and picking up,	—	—	—	—	0	3	6
					<hr/>		
Rent, &c.	—	—	—	—	3	8	9
					0	17	0
					<hr/>		
					4	5	9

PRODUCE.					£.	s.	d.
128 bushels, at 2s.	—	—	—	—	12	16	0
Expences,	—	—	—	—	4	5	9
					<hr/>		
Profit,	—	—	—	—	8	10	3
Ploughing,	—	—	—	0 4 0			
Harrowing,	—	—	—	0 0 4			
Manuring,	—	—	—	0 10 0			
Horse-hoeing,	—	—	—	0 4 0			
					<hr/>		
					0	18	4
					<hr/>		
Clear profit,	—	—	—	—	7	11	10

## OBSERVATIONS.

I apprehend that the largeness of this crop depended, in a good measure, on the horse-hoeings, which kept the soil throughout the season in good tilth, which, in such severe years, must be a matter of great importance. I expected a very small crop; but a clear profit of 7*l.* 10*s.* 4*d.* is by no means trifling. Such a gain from the fallow year, which prepares so well for wheat, or any other crop, is certainly an acquisition that should

should not be slighted. This experiment, at least, proves, that the horse-hoeing culture may be depended on for raising advantageous crops of potatoes in the fallow year, and thereby making a greater profit of that year than by the best corn ones.

### EXPERIMENT N° 3.

Culture, expences, and produce, of twelve acres, field B\*, 1766.

#### CULTURE.

This field yielded wheat in 1759; turneps in 1760; Barley in 1761; was fallowed in 1762; wheat in 1763; fallow in 1764; wheat in 1765. Ploughed up the stubble in October, and water-furrowed it. As I had determined to crop this field with potatoes, I thought I would try various methods of husbandry in it; for being all exactly the same soil, it would give me an opportunity of deciding in future what methods were most advantageous. The whole received two spring-ploughings, and was planted by the 18th of March, in the following methods.

- N° I. Two acres without manure, in double rows, at one foot, on five-foot ridges; 24 bushels of seed.
- N° II. Two acres the same as N° I. but manured with 48 loads of rotten farm-yard dung; 24 bushels of seed.
- N° III. Two acres without manure, in single rows, on three-foot ridges; 20 bushels of seed.
- N° IV. Two acres without manure, in treble rows, at one foot, on five-foot ridges; 32 bushels of seed.
- N° V. One acre, treble rows, at one foot, on five-foot ridges; 16 bushels of seed. Manured thrice; once before every ploughing, 15 loads an acre; 45 in all.
- N° VI. Three acres, single rows, on four-foot ridges, unmanured.

The crowns of all the ridges were hand-hoed before the potatoes came up, and twice afterwards: all of them horse-hoed four times. Ploughed up the crops in October. The produce as follows:

N° I. Ninety-two bushels, or *per* acre 46.

N° II. Two

N° II. Two hundred and three bushels, or *per acre* 101  $\frac{1}{2}$ .

N° III. Seventy-eight bushels, or *per acre* 39.

N° IV. One hundred and twenty-six bushels, or *per acre* 63.

N° V. One hundred and seventy bushels.

N° VI. Ninety bushels, or *per acre* 30.

ACCOUNT of N° I.

EXPENCES.						£.	s.	d.
Three ploughings,	—	—	—	—	—	0	6	0
Harrowing,	—	—	—	—	—	0	0	6
Water-furrowing,	—	—	—	—	—	0	1	0
24 bushels of feed,	—	—	—	—	—	2	8	0
Slicing and planting,	—	—	—	—	—	0	18	0
Three hand-hoeings,	—	—	—	—	—	0	13	0
Four horse-hoeings,	—	—	—	—	—	0	5	4
Ploughing and taking up,	—	—	—	—	—	0	8	0
						<hr/>		
						4	19	10
Rent,	—	—	—	—	—	1	14	0
						<hr/>		
						6	13	10
						<hr/>		
PRODUCE.						£.	s.	d.
92 bushels, at 2 <i>pd.</i>	—	—	—	—	—	7	13	2
Expences,	—	—	—	—	—	6	16	6
						<hr/>		
Profit,	—	—	—	—	—	0	16	8
						<hr/>		
Ploughing,	—	—	—	—	0 8 0			
Horse-hoeing,	—	—	—	—	0 8 0			
Harrowing,	—	—	—	—	0 0 9			
						<hr/>		
						0	16	9
Above profit,	—	—	—	—	—	0	16	8
						<hr/>		
Loss,	—	—	—	—	—	0	0	1
						<hr/>		

A C C O U N T of N<sup>o</sup> II.

E X P E N C E S.						£.	s.	d.
Sandry expenses, the same as N <sup>o</sup> I.	—	—	—	—	—	6	13	10
Manuring,	—	—	—	—	—	1	3	0
						7	16	10
P R O D U C E.						£.	s.	d.
203 bushels, at 1s. 8d.	—	—	—	—	—	13	11	8
Expences,	—	—	—	—	—	7	16	10
Profit,	—	—	—	—	—	5	14	10
Ploughing,	—	—	—	—	0 8 0			
Harrowing,	—	—	—	—	0 0 9			
Manuring,	—	—	—	—	0 15 0			
						1	3	9
Clear profit, 2l. 5s. 6½d. per acre,	—	—	—	—	—	4	11	1

A C C O U N T of N<sup>o</sup> III.

E X P E N C E S.						£.	s.	d.
Three ploughings,	—	—	—	—	—	0	6	0
Harrowing,	—	—	—	—	—	0	0	6
Water-furrowing,	—	—	—	—	—	0	1	0
20 bushels of feed,	—	—	—	—	—	2	0	0
Slicing and planting,	—	—	—	—	—	0	15	0
Three hand-hoeings,	—	—	—	—	—	0	11	0
Four horse-hoeings,	—	—	—	—	—	0	8	0
Ploughing and taking up,	—	—	—	—	—	0	7	0
						4	8	6
Rent, &c.	—	—	—	—	—	1	14	0
						6	2	6
P R O D U C E.						£.	s.	d.
78 bushels, at 1s. 8d.	—	—	—	—	—	6	10	0
Expences	—	—	—	—	—	6	2	6
Profit,	—	—	—	—	—	0	7	6
						Ploughing		

					£.	s.	d.	£.	s.	d.
Ploughing,	—	—	—	—	0	8	0			
Harrowing,	—	—	—	—	0	0	9			
Horfe-hoeing,	—	—	—	—	0	13	0			
								1	1	9
The above profit,	—	—	—	—				0	7	6
								0	14	3
Loss ol. 7s. 1½d. per acre,	—	—	—	—						

ACCOUNT of N<sup>o</sup> IV.

EXPENCES.

						£.	s.	d.
Three ploughings,	—	—	—	—	—	0	6	0
Harrowing,	—	—	—	—	—	0	0	6
Water-furrowing,	—	—	—	—	—	0	1	0
32 bushels of seed,	—	—	—	—	—	3	4	0
Slicing and planting,	—	—	—	—	—	1	4	0
Three hand-hoeings,	—	—	—	—	—	0	15	6
Four horfe-hoeings,	—	—	—	—	—	0	5	4
Ploughing and taking up,	—	—	—	—	—	0	9	0
								6 5 4
Rent, &c.	—	—	—	—	—	1	14	0
								7 19 4

PRODUCE.

						£.	s.	d.
126 bushels, at 1s. 8d.	—	—	—	—	—	10	10	0
Expences,	—	—	—	—	—	7	19	4
								2 10 8
Profit,	—	—	—	—	—			
Ploughing,	—	—	—	—	—	0	8	0
Harrowing,	—	—	—	—	—	0	0	9
Horfe-hoeing,	—	—	—	—	—	0	8	0
								0 16 9
Clear profit, ol. 16s. 11½d per acre,	—	—	—	—	—	1	13	11



ACCOUNT of N<sup>o</sup> V.

EXPENCES.						£.	s.	d.
Three ploughings,	—	—	—	—	—	0	3	0
Harrowing,	—	—	—	—	—	0	0	3
Water-furrowing,	—	—	—	—	—	0	0	6
Manuring,	—	—	—	—	—	0	14	0
16 bushels of feed,	—	—	—	—	—	1	12	0
Slicing and planting,	—	—	—	—	—	0	12	0
Three hand-hoeings,	—	—	—	—	—	0	8	0
Four horse-hoeings,	—	—	—	—	—	0	2	8
Ploughing and taking up,	—	—	—	—	—	0	5	0
						<hr/>		
Rent, &c.	—	—	—	—	—	3	17	5
						0	17	0
						<hr/>		
						4	14	5

PRODUCE.						£.	s.	d.
170 bushels, at 1s. 8d.	—	—	—	—	—	14	3	0
Expences,	—	—	—	—	—	4	14	5
						<hr/>		
Profit,	—	—	—	—	—	9	8	7
Ploughing,	—	—	—	—	0 4 0			
Harrowing,	—	—	—	—	0 0 4½			
Horse-hoeing,	—	—	—	—	0 4 0			
						<hr/>		
						0	8	4½
						<hr/>		
Clear profit,	—	—	—	—	—	9	0	2½

ACCOUNT of N<sup>o</sup> VI.

EXPENCES.						£.	s.	d.
Three ploughings,	—	—	—	—	—	0	9	0
Harrowing,	—	—	—	—	—	0	0	9
Water-furrowing,	—	—	—	—	—	0	1	6
27 bushels of feed,	—	—	—	—	—	2	14	0
Slicing and planting,	—	—	—	—	—	0	19	0
Three hand-hoeings,	—	—	—	—	—	0	15	0
						<hr/>		
Carried over,	—	—	—	—	—	4	19	3

						£.	s.	d.
Brought over,	—	—	—	—	—	4	19	3
Four horse-hoeings,	—	—	—	—	—	0	9	0
Ploughing and taking up,	—	—	—	—	—	0	10	0
						5	18	3
Rent,	—	—	—	—	—	2	11	0
						8	9	3
P R O D U C E.								
90 bushels, at 1s. 8d.	—	—	—	—	—	7	10	0
Loss,	—	—	—	—	—	0	19	3
Ploughing,	—	—	—	—	0 12 0			
Harrowing,	—	—	—	—	0 1 1½			
Horse-hoeing,	—	—	—	—	0 14 6			
						1	7	7½
Total loss, ol. 15s. 7½d. per acre,	—	—	—	—	—	2	6	10½

C O M P A R I S O N.

		£.	s.	d.
Treble rows on five-feet ridges, thrice manured, clear profit <i>per</i> } acre,	—	9	0	2½
Double rows on five-feet ridges, manured, profit,	—	2	5	6½
Treble rows on five-feet ridges, unmanured, profit,	—	0	16	11½
Double rows on five-feet ridges, unmanured, loss,	—	0	0	0½
Single rows on three-feet ridges, unmanured, loss,	—	0	7	1½
Single rows on four-feet ridges, unmanured, loss,	—	0	15	7½

O B S E R V A T I O N S.

This experiment is very decisive on the culture of potatoes in poor, cold, wet, clayey loams. In the first place it is clearly evident, that such a soil is utterly improper for the root. None of these trials, except the highly manured one, yield any profit that is worth considering; and the result of the manured would on other soils have proved very differently. However, the vast superiority of the rich manuring over all, and that of the inferior manuring to all those that received no such advantage, shew plainly enough the great importance of dung to this plant.

Relative to the unmanured divisions, the greater the number of rows the better the crops. Some profit attends *three* on five-feet ridges: the loss of *two* on the same ridges is trifling, but increases with the width

of the rows;—so that nothing can be clearer than the dependance of the crop on the number of the rows. Whether it would extend to the exclusion of horse-hoeing is a point not decided by these experiments. According to the principles of the new husbandry, the wider the intervals, the finer, at least, should be the separate plants; but that was not the case here: the roots were as large and fair at three feet as at four, and those of treble rows at one foot as good as single ones at four. The dung made an alteration, distance none. From whence there is some reason to conclude, that horse-hoeing is not of so much importance to potatoes as to some other crops.

#### EXPERIMENT N<sup>o</sup> 4.

Culture, expences, and produce, of half an acre, field M<sup>s</sup>, 1767.

#### CULTURE.

Yielded wheat in 1766; the stubble of which was ploughed up in October. The latter end of February threw it on to five-feet ridges: the middle of March arched them up, turning in twenty loads of rotten farm-yard dung, and dibbled in three rows of potatoes, one foot asunder on each ridge, using seven bushels; and covered them by one harrowing. The last week in April hand-hoed the crowns of the ridges. The end of May the plants were up high enough to hand-hoe, when that operation was carefully given, and repeated once in June. They were horse-hoed four times, and ploughed up in October: the produce 105 bushels.

#### PROPORTIONS *per* ACRE.

EXPENCES.						£.	s.	d.
Four ploughings,	—	—	—	—	—	0	4	0
Harrowing,	—	—	—	—	—	0	0	1½
Manuring,	—	—	—	—	—	0	19	4
14 bushels of seed,	—	—	—	—	—	1	8	0
Slicing and planting,	—	—	—	—	—	0	10	0
Three hand-hoeings,	—	—	—	—	—	0	7	6
Four horse-hoeings,	—	—	—	—	—	0	2	8
Picking up,	—	—	—	—	—	0	3	6
						<hr/>		
Rent, &c.	—	—	—	—	—	3	15	1½
						0	17	0
						<hr/>		
						4	12	1½
						<hr/>		
						PRO-		

P R O D U C E.					£.	s.	d.
210 bushels, at 1s. 8d.	—	—	—	—	17	10	0
Expences,	—	—	—	—	4	12	1½
Profit,	—	—	—	—	12	17	10½
Ploughing,	—	—	—	0 9 9			
Harrowing,	—	—	—	0 0 4½			
Manuring,	—	—	—	1 5 0			
					1	15	1½
Clear profit,	—	—	—	—	11	2	9

## O B S E R V A T I O N S.

This profit is very considerable ; and is a proof, that the horse-hoeing culture is capable of producing large crops of potatoes, and very profitable ones. The order the land is left in by this crop is excellent, and infinitely exceeds any fallow. There can be no better husbandry than substituting such ameliorating plants as these in the room of fallows : by that means the fallow year is made more profitable than any of the corn ones ; and the latter far more beneficial than when prepared for by fallow. Eleven pounds an acre, clear profit, after so simple a manuring, and so much culture, are more considerable than the profit of three common crops of wheat.

## G E N E R A L O B S E R V A T I O N S.

These few experiments give us great reason to believe, that the horse-hoeing culture may be very profitably applied to the raising potatoes. That vegetable is thereby made a very beneficial fallow crop, preparing the land for wheat much better than a common fallow.

But at the same time that this fact is so clear, it should be observed, that these trials equally prove the necessity of manuring for them ; and that it is a most false idea to think, that horse-hoeing will suffice, instead of dunging. On the contrary, the crops have turned out worthless, and losing ones, notwithstanding all advantages of horse and hand-hoeing, if no dung was applied.

We further find from these trials, that three rows, at one foot asunder, on five-foot ridges, are the most beneficial method of planting, far exceeding either double or single ones.

## S E C T. III.

## COMPARISON of the Old and New Methods.

**W**HEN there are more than one method of cultivating a plant, they might all be included in the comparison, and no other experiments tried than comparative ones; but such a course would require immense expences: for in comparative trials, it is absolutely necessary that all kinds of operations be performed precisely at the same time; consequently the expence of a comparative trial is far greater than of one in which such accuracy is not requisite. For instead of throwing four or five teams at once into a little field, however they may be wanted elsewhere, they are employed at more convenient times. This circumstance obliges one to be compendious in comparative trials, if there is any design of accuracy. My trials on potatoes in the new and old methods were not, for these reasons, so extensive as they should have been, had not a circumscribed fortune made it necessary often to contract my views, though sorely against my will.

EXPERIMENT N<sup>o</sup> I.

Culture, expences, and produce, of half an arce, field M\*, 1765.

## CULTURE.

Yielded barley in 1764; the stubble of which was ploughed up in autumn. The middle of March ploughed it again, leaving one half flat, and throwing the other half on to four-foot ridges. The same month  
manured

manured the whole equally with fifteen loads of rotten farm-yard dung. The first week in April ploughed in the dung, arching up the ridges; and leaving the other half again flat, harrowed once, and planted the flat part promiscuously at one foot from set to set, and two rows on each ridge at one foot asunder. In the former used five bushels; in the latter two and a half. The middle of May hand-hoed all the promiscuous rood, and the crowns of the ridges of the other. As soon as the plants appeared sufficiently distinct, which was the first week in June, hand-hoed them carefully, cutting up the weeds, and loosening the surface. This operation was repeated once more in July. The first horse-hoeing of the ridges was given directly after the hand-hoeing, and repeated thrice more: the last left the ridges in their first form. Ploughed up both in October.

P R O D U C E.

						<i>Bushels.</i>
Old husbandry,	—	—	—	—	—	43
Horse-hoed,	—	—	—	—	—	23
Superiority, 80 <i>per</i> acre,		—	—	—	—	20

A C C O U N T of the O L D M E T H O D.

E X P E N C E S.

						<i>£. s. d.</i>
Four ploughings,	—	—	—	—	—	0 4 0
Harrowing,	—	—	—	—	—	0 0 3
Manuring,	—	—	—	—	—	0 8 0
20 bushels of seed,	—	—	—	—	—	2 0 0
Slicing and planting,	—	—	—	—	—	0 17 0
Three hand-hoeings,	—	—	—	—	—	0 15 0
Ploughing and picking up,	—	—	—	—	—	0 6 0
						<hr/> 4 10 9
Rent, &c.	—	—	—	—	—	0 17 0
						<hr/> 5 7 9

P R O D U C E.

						<i>£. s. d.</i>
172 bushels, at 2s.	—	—	—	—	—	17 4 0
Expences,	—	—	—	—	—	5 7 9
Profit, Carried over,	—	—	—	—	—	<hr/> 11 16 3

						£.	s.	d.
Brought over, Profit,	—	—	—	—	—	11	16	3
Ploughing,	—	—	—	—	0 4 0			
Harrowing,	—	—	—	—	0 0 4½			
Manuring,	—	—	—	—	0 5 7½			
						0	10	0
Clear profit,	—	—	—	—	—	11	6	3

## ACCOUNT of the HORSE-HOED.

						£.	s.	d.
EXPENCES.								
Four ploughings,	—	—	—	—	—	0	4	0
Harrowing,	—	—	—	—	—	0	0	3
Manuring,	—	—	—	—	—	0	8	6
10 bushels of seed,	—	—	—	—	—	1	0	0
Slicing and planting,	—	—	—	—	—	0	8	0
Three hand-hoeings,	—	—	—	—	—	0	10	0
Four horse-hoeings,	—	—	—	—	—	0	3	0
Taking up,	—	—	—	—	—	0	4	0
						2	17	9
Rent, &c.	—	—	—	—	—	0	17	0
						3	14	9

						£.	s.	d.
PRODUCE.								
92 bushels, at 2s.	—	—	—	—	—	9	4	0
Expences,	—	—	—	—	—	3	14	9
Profit,	—	—	—	—	—	5	9	3
Ploughing,	—	—	—	—	0 4 0			
Harrowing,	—	—	—	—	0 0 4½			
Manuring,	—	—	—	—	0 5 7½			
Horse-hoeing,	—	—	—	—	0 4 9			
						0	14	9
Clear profit,	—	—	—	—	—	4	14	6

## C O M P A R I S O N.

					£.	s.	d.
Profit by the old method,	—	—	—	—	11	6	3
Ditto by the new,	—	—	—	—	4	14	6
Superiority of the former,	—	—	—	—	6	11	9

## O B S E R V A T I O N S.

Nothing can be more decisive than this comparison: the superiority of the common method is so great, that it leaves not a doubt in one's mind. The advocates for horse-hoed crops extol the influence of hoe-ploughing so much, that it naturally causes one to reflect on the occasion of this superiority. It must arise from the land, in one method, being so much fuller stocked with plants than in the other. Horse-hoeing ought to make a few roots exceed, in weight, a great many; but with potatoes I can perceive no such effect; or, at least, it is so small, that the superior number, in the promiscuous planting, far more than balances it. I cannot help conjecturing, that the plough, in the horse-hoeing, cuts and tears some fibres of the roots that would produce potatoes, or else damages the roots already formed; but of this I have no proof.

Respecting the state of the land after each crop, experiment must decide the superiority; but I cannot help remarking, that the appearance is in favour of the promiscuous planting: the land is not only very loose and fine, but there is a putrid moisture in it, that is wanting in the other. This is owing merely to the thickness of the shade, which is as sure a method of killing weeds, and both pulverizing and enriching the land, as any horse-hoeing in the world can be: however, we must, in no respect, depend on one trial for the decision of so important a point; future ones must coincide to confirm the result.

E X P E R I M E N T N<sup>o</sup> 2.

Culture, expences, and produce, of half an acre, field M\*, 1766.

## C U L T U R E.

Yielded wheat in 1765: ploughed up the stubble in autumn; stirred it again the first week in March, throwing half of it on to five-feet ridges, and leaving the other flat. Manured the whole equally with fifteen loads of farm-yard dung: turned it in, by the third ploughing, the 16th, arching up the ridges; the other flat: harrowed and planted it

[H b 2]



it, the ridges with three rows, at one foot asunder, using  $3\frac{1}{2}$  bushels of seed; the flat half, promiscuously at one foot every way, five bushels. Hand-hoed all the ground of the flat part, and the crowns of the ridges, before the plants appeared, and again as soon as they were distinctly seen. Repeated this operation once more to each: also horse-hoed the ridges four times. Ploughed up both in October. Produce of the promiscuous 48 bushels: of the horse-hoed 32.

## ACCOUNT of the OLD METHOD.

EXPENCES.						£.	s.	d.
Four ploughings,	—	—	—	—	—	0	4	0
Harrowing,	—	—	—	—	—	0	0	3
Manuring,	—	—	—	—	—	0	8	6
20 bushels of potatoes,	—	—	—	—	—	2	0	0
Slicing and planting,	—	—	—	—	—	0	15	0
Three hand-hocings,	—	—	—	—	—	0	14	0
Taking up,	—	—	—	—	—	0	5	6
						<hr/>		
						4	7	3
Rent, &c.	—	—	—	—	—	0	17	0
						<hr/>		
						5	4	3

PRODUCE.						£.	s.	d.
192 bushels, at 1s. 8d.	—	—	—	—	—	16	0	0
Expences,	—	—	—	—	—	5	4	3
						<hr/>		
Profit,	—	—	—	—	—	10	15	9
Ploughing,	—	—	—	0	9	7		
Harrowing,	—	—	—	0	0	9		
Manuring,	—	—	—	0	9	4		
						<hr/>		
						0	19	8
Clear profit,	—	—	—	—	—	9	16	1

## ACCOUNT of the NEW METHOD.

EXPENCES.						£.	s.	d.
Four ploughings,	—	—	—	—	—	0	4	0
Harrowing,	—	—	—	—	—	0	0	3
						<hr/>		
Carried over,	—	—	—	—	—	0	4	3

					£.	s.	d.
Brought over,	—	—	—	—	0	4	3
Manuring,	—	—	—	—	0	8	6
15 bushels of potatoes,	—	—	—	—	1	10	0
Slicing and planting,	—	—	—	—	0	11	0
Three hand-hoeings,	—	—	—	—	0	8	0
Four horse-hoeings,	—	—	—	—	0	2	8
Taking up,	—	—	—	—	0	4	9
					<hr/>		
Rent, &c.	—	—	—	—	3	9	2
					0	17	0
					<hr/>		
					4	6	2
					<hr/>		

						£.	s.	d.
P R O D U C E.								
128 bushels, at 1s. 8d.	—	—	—	—		10	13	0
Expences,	—	—	—	—		4	6	2
					<hr/>			
Profit,	—	—	—	—		6	6	10
Ploughing,	—	—	—	—	0	9	7	
Harrowing,	—	—	—	—	0	0	9	
Manuring,	—	—	—	—	0	9	4	
Horse-hoeing,	—	—	—	—	0	4	0	
					<hr/>			
						1	3	8
					<hr/>			
Clear profit,	—	—	—	—		5	3	2
					<hr/>			

## C O M P A R I S O N.

					£.	s.	d.
Profit by the old method,	—	—	—	—	9	16	1
new ditto,	—	—	—	—	5	3	2
					<hr/>		
Superiority of the former,	—	—	—	—	4	12	11
					<hr/>		

## O B S E R V A T I O N S.

This experiment demonstrates the superiority of the promiscuous culture to that of horse-hoeing. This must, as I before observed, be owing to the land nourishing so many more plants in one way than in the other, without the operation of horse-hoeing making amends for such a loss. When the land is properly manured, a certain space of it will suffice for

one set; suppose a square foot. Now, if you assign two square feet to each set, the potatoes may be larger; but it does not, therefore, follow, that the crop should be greater: and if one foot will afford nourishment for one set, it seems to be plain, that the crop must suffer from thinner feeding. I have heard several gardeners mention their being cautious in hand-hoeing potatoes, preferring hand-weeding much, on account of cutting the roots; and, indeed, there is a sort (many of which are among my crops) that root remarkably shallow. At the end of the season, when potatoes are three-fourths, or full grown, they are seen quite bare, part being above ground, of a dark coloured skin, almost the same of the earth. Now, it is easy to conceive, that all hoeing must be pernicious to such a sort; and I know not what good horse-hoeing can do to them to answer the certain ill. I have generally given all such operations pretty quick upon each other, early in the season, which prevents much damage; but, I apprehend, not all. But whether this reasoning be allowed or not, still the fact remains the same; the promiscuous method almost doubly advantageous.

EXPERIMENT N<sup>o</sup> 4.

Culture, expences, and produce, of half an acre, field M\*, 1767.

## CULTURE.

Yielded barley in 1766: the stubble ploughed up in November: stirred it again in March, half of it flat, and half on to five-feet ridges. Manured the whole with twelve loads of rotten farm-yard dung: turned it in the beginning of April; one part again on the flat, and arched up the ridges. Planted the latter with three rows on each, one foot asunder; and the former promiscuously, about a foot from each. Used five bushels for one, and three for the other. The first week in May hand-hoed all the ground of the flat part, and the crowns of the ridges; and gave two more hoeings after the plants were up: also horse-hoed those on the ridges four times. Ploughed them up in October. Produce of the common method 39 bushels: of the horse-hoed 27.

## ACCOUNT of the OLD METHOD.

	EXPENCES.					£.	s.	d.
Four ploughings,	—	—	—	—	—	0	4	0
Harrowings,	—	—	—	—	—	0	0	3
Manuring,	—	—	—	—	—	0	7	1
Carried over,	—	—	—	—	—	0	11	4

					£.	s.	d.
Brought over,	—	—	—	—	0	11	4
20 bushels, setts,	—	—	—	—	1	13	4
Slicing and planting,	—	—	—	—	0	14	0
Three hand-hoeings,	—	—	—	—	0	12	0
Taking up,	—	—	—	—	0	5	0
				*	<hr/>		
Rent, &c.	—	—	—	—	3	15	8
					0	17	0
					<hr/>		
					4	12	8

	P R O D U C E.				£. s. d.		
156 bushels, at 1s. 8d.	—	—	—	—	13	0	0
Expences,	—	—	—	—	4	12	8
Profit,	—	—	—	—	8	7	4
Ploughing,	—	—	—	0 9 9			
Harrowing,	—	—	—	0 0 9			
Manuring,	—	—	—	0 7 6			
				—	0	18	0
Clear profit,	—	—	—	—	7	9	4

ACCOUNT of the NEW METHOD.

EXPENSES.					£.	s.	d.
Four ploughings,	—	—	—	—	0	4	0
Harrowing,	—	—	—	—	0	0	3
Manuring,	—	—	—	—	0	7	1
12 bushels of potatoes,		—	—	—	1	0	0
Slicing and planting,	—	—	—	—	0	7	0
Three hand-hoeings,	—	—	—	—	0	7	6
Four horse-hoeings,	—	—	—	—	0	2	8
Taking up,	—	—	—	—	0	5	0
					<hr/>		
					2	13	6
Rent, &c.	—	—	—	—	0	17	0
					<hr/>		
					3	10	6

PRO-

P R O D U C E.						£.	s.	d.
108 bushels, at 1s. 8d.	—	—	—	—	—	8	16	4
Expences,	—	—	—	—	—	3	10	6
Profit,	—	—	—	—	—	4	5	10
Ploughing,	—	—	—	—	0 9 9			
Harrowing,	*—	—	—	—	0 0 9			
Manuring,	—	—	—	—	0 7 6			
Horse-hoeing,	—	—	—	—	0 4 0			
						1	2	0
Clear profit,	—	—	—	—	—	3	3	10

## C O M P A R I S O N.

						£.	s.	d.
Profit by the old method,	—	—	—	—	—	7	9	4
Ditto by the new,	—	—	—	—	—	3	3	10
Superiority,	—	—	—	—	—	4	5	6

## O B S E R V A T I O N S.

The promiscuous crop is here more than doubly better than the horse-hoe: A superiority so great, that it is decisive: Nor could I perceive scarce any difference in the size of the roots in favour of the latter, or, at least, the superiority in this respect was extremely trifling: for out of three gentlemen, who viewed the potatoes, only one thought the horse-hoe roots the largest, and he was in doubt.

## G E N E R A L O B S E R V A T I O N S on this C O M P A R I S O N.

The clearest light into which the result of these trials can be thrown, will be to draw the average of the expences, product, and profit, that we may not only know on which side the superiority lies, but also wherein it consists.

O L D M E T H O D.

E X P E N C E S.				£.	s.	d.
Experiment N <sup>o</sup> 1,	—	—	—	5	17	9
2,	—	—	—	6	3	11
3,	—	—	—	5	10	8
				17	12	4

Average, 5*l.* 17*s.* 5*d.*

P R O D U C E.

				Buskels.	£.	s.	d.
N <sup>o</sup> 1,	—	—	—	172	17	4	0
2,	—	—	—	192	16	0	0
3,	—	—	—	156	13	0	0
				520	46	4	0
Average,	—	—	—	173	15	8	0

P R O F I T.

				£.	s.	d.
Experiment N <sup>o</sup> 1,	—	—	—	11	6	3
2,	—	—	—	9	16	1
3,	—	—	—	7	9	4
				28	11	8

Average, 9*l.* 10*s.* 6*d.*

N E W M E T H O D.

E X P E N C E S.				£.	s.	d.
N <sup>o</sup> 1,	—	—	—	4	9	6
2,	—	—	—	5	9	10
3,	—	—	—	4	12	6
				14	11	10

Average, 4*l.* 17*s.* 3*d.*

## P R O D U C E.

			<i>Busbels.</i>		<i>£. s. d.</i>
Experiment N <sup>o</sup> 1,	—	—	92	—	9 4 0
2,	—	—	128	—	10 13 0
3,	—	—	108	—	8 16 4
			<u>328</u>	—	<u>28 13 4</u>
Average,	—	—	<u>109</u>	—	<u>9 11 1</u>

## P R O F I T.

					<i>£. s. d.</i>
Experiment N <sup>o</sup> 1,	—	—	—	—	4 14 6
2,	—	—	—	—	5 3 2
3,	—	—	—	—	3 3 10
					<u>13 1 6</u>
Average, 4l. 7s. 2d.					

					<i>£. s. d.</i>
Expences of the old method,	—	—	—	—	5 17 5
— of the new,	—	—	—	—	4 17 3
Excess of the former,	—	—	—	—	<u>1 0 2</u>

			<i>Busbels.</i>		<i>£. s. d.</i>
Produce of the old method,	—	—	173	—	15 8 0
Ditto of the new,	—	—	109	—	9 11 1
			<u>64</u>	—	<u>5 16 11</u>

					<i>£. s. d.</i>
Profit of the old method,	—	—	—	—	9 10 6
— of the new,	—	—	—	—	4 7 2
Superiority,	—	—	—	—	<u>5 3 4</u>

This state of the comparison sets it, at once, in a clear light: we find the old method more expensive than the new, by about twenty shillings an acre, which excess is in the larger quantity of feed. In produce

duce it is superior, pretty nearly, as five to three: and this shews, that the method is better adapted to the plant than horse-hoeing. For if that practice will not give larger crops than the other method, why use it? It is evident, by the greatness of the superiority, that the land will yield nourishment to a greater number of plants than are set in the horse-hoeing way; and yet treble rows, on five-feet ridges, fill the land much more than the methods which have been most recommended. This superiority of product shews plainly, that the potatoe is not one of those vegetables that require more room and tillage, while growing, than promiscuous crops will allow. However, in this point, as in all others, I confine my observations to my own soils. This comparison *may* turn out differently on other lands: I think it utterly improbable; but still it is possible, and consequently one must not be too free in general expressions.

In profit, the superiority of the old method exceeds the whole amount of the new. This is so very decisive, that it leaves not a doubt of the matter. Respecting the two methods in the circumstance of cleaning and ameliorating the land for wheat or other crops, I prefer the promiscuous. From the most attentive observations I made on ploughing up the crops, I think the land broke up in a much looser manner than the horse-hoed, and at the same time with a vastly richer appearance, blacker and more moist. The thick shade of the potatoes, unbroken by any horse-hoeing intervals, could scarcely fail of this effect; and every one, who has made experimental agriculture his employment, must know that a thick crop of the ameliorating sort, *enriches*, and much more than a fallow, and consequently than horse-hoeing.

Upon the whole, I shall not scruple to recommend the promiscuous planting of potatoes in the method pursued in the preceding experiments preferable to the horse-hoeing culture of them.



## C H A P. V.

## O F R E D B E E T S.

I NEVER heard of this root being cultivated as a food for cattle; but seeing the size it comes to in the garden, I thought it, at least, worth trying in the field, to discover if good common culture would make it produce a quantity of food sufficient to answer the expences with profit. I had before tried hogs with many roots from the garden, and found that they eat them very freely.

E X P E R I M E N T N<sup>o</sup> I.

Marked five square perches in field L\*, in March 1764, of land that had been ploughed the autumn before. Manured it with twenty-five bushels, or twenty loads an acre, of rotten farm-yard dung; ploughed it in, and harrowed in beet-seed the end of March. The plants arose very freely, and were hand-hoed to the distance of about eighteen inches every way, and after that twice more. The ground being left quite clean and garden-like, dug up the roots in October: the product six bushels, or *per* acre 192.

PROPORTIONS *per* ACRE as follow:

## EXPENCES.

£. s. d.

Two ploughings,	—	—	—	—	—	0	2	0
Harrowing,	—	—	—	—	—	0	0	3
Water-furrowing,	—	—	—	—	—	0	0	3
Manuring,	—	—	—	—	—	0	5	9
Seed,	—	—	—	—	—	0	8	0
Sowing,	—	—	—	—	—	0	0	6
Thrice hand-hoeing,	—	—	—	—	—	0	17	6
Digging up,	—	—	—	—	—	0	12	0
Carting home, cleaning, topping, and laying up,	—	—	—	—	—	0	7	6
								<hr/>
						2	13	9
Rent, &c.	—	—	—	—	—	0	17	0
								<hr/>
						3	10	9

## PRODUCE.

£. s. d.

192 bushels, at 9d.	—	—	—	—	—	7	4	0
Expences,	—	—	—	—	—	3	10	9
								<hr/>
Profit,	—	—	—	—	—	3	14	9
Ploughing,	—	—	—	—	0	3	0	
Harrowing,	—	—	—	—	0	0	6	
Manuring,	—	—	—	—	0	4	2	
Carting home,	—	—	—	—	0	1	8	
								<hr/>
						0	9	4
								<hr/>
Clear profit,	—	—	—	—	—	3	5	5

## OBSERVATIONS.

I have charged the crop at the price which I think it worth for feeding lean swine, from the minute I took of that application of it. The profit is not inconsiderable on a crop that pays the expence of a manuring, and much hand-hoeing. Beets are, like all other roots, of an ameliorating nature, and ought in husbandry to be a substitute for a fallow; in which use they certainly are equal to any other. This product would have been more considerable had the ground been deeper ploughed, as was evident from a great number of the roots being deformed towards the ends, for want of depth to penetrate in.

EXPERIMENT N<sup>o</sup> 2.

In October 1764, trench-ploughed ten perches of barley stubble in field M\*: stirred them again in March 1765, and manured with fifty bushels of rotten farm-yard dung, which is twenty loads an acre. Ploughed in the dung the first week in April, and harrowed in red beet seed. Hand-hoed the plants three times, setting them out to the distance of about eighteen inches asunder. They have vastly the advantage of carrots in the hoeing: for the colour and spreading tops distinguish them so clearly from the weeds, that the men hoe them, at first, with large hoes without much difficulty. Dug them up in October: the produce 17 bushels, or *per acre* 272.

EXPENCES.					£.	s.	d.
Trench-ploughing,	—	—	—	—	0	2	0
Three common ditto,	—	—	—	—	0	3	0
Harrowing,	—	—	—	—	0	0	3
Manuring,	—	—	—	—	0	6	0
Seed and Sowing,	—	—	—	—	0	8	6
Hand-hoeing thrice,	—	—	—	—	0	18	0
Digging up,	—	—	—	—	0	14	0
Carting home, cleaning, topping, and laying up,	—	—	—	—	0	8	6
					<hr/>		
Rent, &c.	—	—	—	—	3	0	3
					0	17	0
					<hr/>		
					3	17	3

PRODUCE.					£.	s.	d.
272 bushels, at 9d.	—	—	—	—	10	4	0
Expences,	—	—	—	—	3	17	3
					<hr/>		
Profit,	—	—	—	—	6	6	9
Ploughing,	—	—	—	0 5 0			
Harrowing,	—	—	—	0 0 4½			
Manuring,	—	—	—	0 3 9			
Carting home,	—	—	—	0 2 3			
					<hr/>		
					0	11	4½
					<hr/>		
Clear profit,	—	—	—	—	5	15	4½

OBSER-

## O B S E R V A T I O N S.

The product was given to fows that had pigs, and the value minuted at *9d. per bushel*. The crop is not so profitable as I expected from the deep ploughing; but the extreme drought, which held throughout the season, was a great enemy to it. I have little doubt but in a wetter year the amount would have been different. We are not, however, to despise a fallow crop that pays *5*l.* 15*s.* 0*d.** an acre, and leaves the land in excellent order for one of corn, or any thing else. It is considerable, ~~and far more than~~ is to be expected from the corn itself.

E X P E R I M E N T N<sup>o</sup> 3.

In November 1765, trench-ploughed a piece of wheat stubble in field M\*, containing fifteen square perches: gained a depth of fourteen inches. The first week in March ploughed it again, and manured it with 120 bushels of rotten farm-yard dung, which are the proportion of thirty-two loads *per acre*. The 11th turned it in, and harrowed in the seed. The plants came up very favourably, and flourished finely throughout the season. They were hand-hoed thrice, and dug up in November. Produce forty-five bushels, or *per acre* 480. They were given to lean swine, and paid *10*d.** *per bushel*.

## E X P E N C E S.

						£.	s.	d.
Trench-ploughing,	—	—	—	—	—	0	2	0
Three common ditto,	—	—	—	—	—	0	3	0
Harrowing,	—	—	—	—	—	0	0	3
Manuring,	—	—	—	—	—	0	9	1
Seed and sowing,	—	—	—	—	—	0	9	0
Thrice hand-hoeing,	—	—	—	—	—	0	19	6
Digging up,	—	—	—	—	—	1	0	0
Carting, topping, cleaning, and laying up,	—	—	—	—	—	0	15	0
						3	17	10
Rennt, &c.	—	—	—	—	—	0	17	0
						4	14	10

P R O D U C E.						£.	s.	d.
480 bushels, at 10 <i>l.</i>	—	—	—	—	—	20	0	0
Expences,	—	—	—	—	—	4	14	10
Profit,	—	—	—	—	—	15	5	2
Ploughing,	—	—	—	—	0 11 11½			
Harrowing,	—	—	—	—	0 0 9			
Manuring,	—	—	—	—	0 10 0			
Carting home,	—	—	—	—	0 5 0			
							7	8½
Clear profit,	—	—	—	—	—	13	17	5½

## O B S E R V A T I O N S.

This is a very noble crop, and the profit much greater than can be gained by any branch of common husbandry. A fallow crop that greatly ameliorates the land from its nature, and the thickness of its shade, and at the same time cleans it by much tillage, and leaves it as fine as a garden, such a crop to pay above thirteen guineas an acre, is a degree of profit highly worthy of the consideration of those gentlemen, whose enlarged views extend beyond the line of their neighbours husbandry. It is a point of much importance, that such a profit is made by the application of the produce to the feeding of swine, and consequently to the raising large quantities of the best manure; nor can a market ever be wanting for any vegetable a hog will eat.

E X P E R I M E N T N<sup>o</sup> 4.

Culture, expences, and produce, of half a rood, field L\*, 1767.

## C U L T U R E.

Yielded wheat in 1766: trench-ploughed the stubble in October, and water-furrowed it. The beginning of March stirred it again, and manured it with four loads of rotten farm-yard dung: turned in the dung by a second spring-ploughing, and then harrowed in the beet-feed. The plants came up as favourably as possible; were hand-hoed thrice, and dug up in October. Produce fifty-five bushels, or *per* acre 440. Used them for feeding sows and pigs: they paid 9*d.* *per* bushel.

## EXPENCES.

					£.	s.	d.
Trench-ploughing,	—	—	—	—	0	2	0
Three common ditto,	—	—	—	—	0	3	0
Harrowing,	—	—	—	—	0	0	3
Water-furrowing,	—	—	—	—	0	0	6
Manuring,	—	—	—	—	0	8	1
Seed and sowing,	—	—	—	—	0	10	0
Three hand-hoeings,	—	—	—	—	0	16	0
Five, egg up,	—	—	—	—	0	19	0
Carting, clearing, topping, and laying up,	—	—	—	—	0	12	0
					<hr/>		
Rent, &c.	—	—	—	—	3	10	10
					0	17	0
					<hr/>		
					4	7	10
					<hr/>		

## PRODUCE.

					£.	s.	d.
440 bushels, at 9d.	—	—	—	—	16	10	0
Expences,	—	—	—	—	4	7	0
					<hr/>		
Profit,	—	—	—	—	12	2	2
Ploughing,	—	—	—	0 12 2½			
Harrowing,	—	—	—	0 0 9			
Manuring,	—	—	—	0 10 0			
Carting home,	—	—	—	0 4 5			
					<hr/>		
					1	7	4½
					<hr/>		
Clear profit,	—	—	—	—	10	14	9½
					<hr/>		

## OBSERVATIONS.

It is very evident from this trial, that the culture of red beets is an object of real importance to the spirited farmer. He will make no such profit as 10*l.* 14*s.* 0*d.* by corn, or any crop commonly cultivated: besides the infinite advantage of occupying his fields with plants that clean and ameliorate them, not only by the immediate culture, but also the beneficial consequence of raising large quantities of dung in the consumption.

## GENERAL OBSERVATIONS ON these EXPERIMENTS.

Had I continued longer on the farm, I should have extended my trials on this root, but not upon so large a scale as some others, because

it seemed to demand much the same treatment as carrots, but is not of equal value. But on my clayey loams, carrots would by no means equal it; for which reason I had determined to appropriate, by degrees, a field of that soil for its production, and to preserve the gravelly loams for carrots. I shall draw the average of these trials, that the idea may be the clearer.

EXPENCBS.				£.	s.	d.
Experiment N <sup>o</sup> 1,	—	—	—	4	0	1
2,	—	—	—	4	8	7
3,	—	—	—	5	15	2
4,	—	—	—	5	15	2
				20	6	5

Average, 5*l.* 1*s.* 7½*d.*

## P R O D U C E.

				Buskels.	£.	s.	d.
Experiment N <sup>o</sup> 1,	—	—	192	—	7	4	0
2,	—	—	272	—	10	4	0
3,	—	—	480	—	20	0	0
4,	—	—	440	—	16	10	0
				1384	53	18	0
Average,	—	—	346	—	13	9	6

## P R O F I T.

				£.	s.	d.
Experiment N <sup>o</sup> 1,	—	—	—	3	5	5
2,	—	—	—	5	15	4½
3,	—	—	—	13	17	5½
4,	—	—	—	10	14	9½
				33	13	0½

Average, 8*l.* 8*s.* 3*d.*

This state of the culture throws it into a very clear light, and proves, that red beets may be introduced into the agriculture of this kingdom with great profit. The above average of eight guineas an acre, clear profit,

profit, is much beyond the advantage of any fallow crop used by the farmers: but I do not think the general view of the culture so important as the particular circumstance of their thriving beneficially on the clayey loam, when well manured. N<sup>o</sup> 4. which yields a clear profit of above ten guineas an acre, is on that soil. Now carrots I have found to exceed beets on the gravelly loams; but on the heavier soil carrots will not equal this profit of ten guineas, consequently the propriety of the culture is striking; and I cannot but think the introduction on such soils a matter greatly to be wished: and I propose, in any future farm in which I may live, to try this root further, especially if the land is not such as will yield good crops of carrots.



## C H A P. VI.

OF JERUSALEM ~~ART~~ICHOKES.

**I** NEVER heard of this root being introduced into field husbandry. I first tried it, not from any particular expectation of its proving beneficial, but through the mere curiosity of trying every thing. I took the first hint from observing my hogs to eat very freely a few bushels of refuse ones that were thrown on the dung-hill. My experiments on them have been neither numerous, nor extensive. Objects which never were pursued in the farming stile, could not be begun and perfected at once. Had I continued longer on my farm, I should have been able to have presented the reader with a more complete series.

EXPERIMENT N<sup>o</sup> I.

The middle of March 1764, planted a square perch with Jerusalem artichokes, in field L\*: set them in rows two feet asunder, and the sets (sliced like potatoes) one foot from each other. The land was ploughed the October before, and dug at the time of setting. As soon as they were up distinct, hand-hoed them clean. Repeated that operation twice afterwards, earthing up the rows both times. Dug them up the last week in October: the produce two bushels and a half, or *per* acre 400.

This produce appears to me to be very considerable, and far more than potatoes would, by all accounts, have yielded without dung. The quan-

tity is so great, that I shall repeat the trial in future, with some variations; particularly in giving the crop the advantage of manuring. This root is so little used, even in gardens hereabouts, that the market price is no valuation; nor have I any rule by which to value it: however, future trials may enable me to gain a more accurate knowledge of it in this respect.

EXPERIMENT N<sup>o</sup> 2.

In March 1765, marked five square perches in field L\*, that had been ploughed in autumn, and also in the spring. Manured them with twenty-five bushels of rotten farm-yard dung, which is at the rate of twenty loads an acre; turned in the dung by a third ploughing; harrowed it once, and dibbled Jerusalem artichokes, in rows equally distant, at two feet asunder; the rows one foot from each other. Hand-hoed them three times, earthing them up the two last. Ploughed them up in October: the produce eleven bushels three pecks and a half, or *per* acre 380 bushels.

PROPORTIONS *per* ACRE.

EXPENCES.					£.	s.	d.
Three ploughings,	—	—	—	—	0	3	0
Harrowing,	—	—	—	—	0	0	3
Manuring,	—	—	—	—	0	5	8
10 bushels of seed,	—	—	—	—	1	4	0
Slicing and planting,	—	—	—	—	0	7	6
Three hand-hoings,	—	—	—	—	0	18	0
Pulling up the stalks,	—	—	—	—	0	6	0
Ploughing and picking up twice,	—	—	—	—	0	9	0
Carting home, &c.	—	—	—	—	0	6	0
					3	19	5
Rent, &c.	—	—	—	—	0	17	0
					4	16	5

PRODUCE.					£.	s.	d.
380 bushels, at 1s.	—	—	—	—	19	0	0
Expences,	—	—	—	—	4	16	5
Profit, Carried over,	—	—	—	—	14	3	7

							£.	s.	d.
Brought over, Profit,	—	—	—	—	—	—	14	3	7
Ploughing,	—	—	—	—	0	5	0		
Harrowing,	—	—	—	—	0	0	4	$\frac{1}{2}$	
Manuring,	—	—	—	—	0	3	9		
Carting home,	—	—	—	—	0	2	3		
							0	11	4 $\frac{1}{2}$
Clear profit,	—	—	—	—	—	—	13	12	2 $\frac{1}{2}$

## O B S E R V A T I O N S.

With regard to the price at which this crop is charged, I should observe, that I take it from a minute I made of the value in feeding lean swine. Such trials are never decisive from their nature, and of chief use in offering an opportunity of drawing the average of several: however, in the present case I had no other guide. — The selling price was from 20*d.* to 2*s.* a bushel; but then the quantity is so small, that it is to be utterly disregarded. Crops of this nature, that cannot be consumed at home, are not objects with the farmer. The charge of pulling up the stalks should be explained: they grow from five to eight feet high, very large, strong, and luxuriant. Before a plough can enter the field, they must be pulled up by hand: very few roots come with them; but the few that may arise are to be plucked from off them, and thrown into baskets, and the stalks laid in heaps. So far I charge to the account of the crop: carts then come and load them for littering the farm-yard, which expence is charged to the farm-yard. But let me remark, that here lies a considerable benefit of the plant; the stalks are worth far more than this expence of carriage, for making into dung, and would amount on an acre of land to from four to ten waggon loads. If they were cultivated in large, the farm-yard might be well littered from them alone.

The profit of this crop shews evidently, that Jerusalem artichokes are, by no means, to be slighted in husbandry. This piece yields to the full as much profit as four crops of wheat. Surely, therefore, it behoves every man to try it on his various soils, that he may cultivate it if they suit the plant. As to the state of the land, after the artichokes, I must confess myself much in doubt. I examined it in the taking up, and found it dry as a bone, and full of whitish powdered earth, without the least appearance or feeling of that moisture and putrid fermentation bred on the soil by all the other roots with which I am acquainted. Indeed, I cannot wonder at the circumstance, if it leaves the land

land ever so poor; for the product in roots is very great, and in stalks much greater than of any crop that is cultivated: but this point I shall try experimentally. In one way it certainly prepares excellently: an acre that yields nineteen pounds worth of food for cattle, may easily be made to recruit two that are exhausted.

But this product would undoubtedly have been much greater in a wetter season. The severe drought that lasted throughout so great a part of the summer, I am confident, affected the plants much.

### EXPERIMENT N<sup>o</sup> 3.

Culture, expences, and produce, of half a rood, field L\*, 1766.

#### CULTURE.

In the taking up the last crop, I had observed, that the stait roots and fibres of the artichokes were large, and seemed to have the power of striking deep. This determined me then to prepare for the next crop by trench-ploughing, which I then accordingly did on this piece of land, and water-furrowed it for the winter. I took advantage of the remarkable fine weather, the three first weeks in March, to finish the preparation for the crop, and to get it into the ground. I manured it with four loads of rotten farm-yard dung, and turned it in by a ploughing; harrowed the land once, and on that harrowing dibbled in the plants in rows at two feet; the sets one foot from each other, using ten bushels of roots. Before the plants came up, I ordered the ground all to be hand-hoed; and the rows, when up, were hoed and earthed up twice. The plants flourished greatly. In October they were taken up. Produce sixty-three bushels, or *per* acre 504. They were given to swine of all sorts; some were fatted on them when boiled and mixed with pollard. Sows with pigs also had them, and the lean stock. My calculation of the value of them in these applications was 11*d.* a bushel on an average.

#### EXPENCES.

					£.	s.	d.
Trench-ploughing,	—	—	—	—	0	2	0
Two other ditto,	—	—	—	—	0	2	0
Water-furrowing.	—	—	—	—	0	0	6
Harrowing,	—	—	—	—	0	0	3
Manuring,	—	—	—	—	0	10	3
10 bushels of feed,	—	—	—	—	1	0	0
Slicing and planting,	—	—	—	—	0	7	6
Carried over,	—	—	—	—	2	2	6

						£.	s.	d.
Brought over,	—	—	—	—	—	2	2	6
Three hand-hoeings,	—	—	—	—	—	0	17	6
Pulling up the stalks,	—	—	—	—	—	0	7	6
Ploughing and picking up twice,	—	—	—	—	—	0	10	0
Carting home, &c.	—	—	—	—	—	0	8	6
						<hr/>		
Rent,	—	—	—	—	—	4	6	0
						0	17	0
						<hr/>		
						25	3	0
						<hr/>		
P R O D U C E :						£.	s.	d.
504 bushels, at 11d.	—	—	—	—	—	23	2	0
Expences,	—	—	—	—	—	5	3	0
						<hr/>		
Profit,	—	—	—	—	—	17	19	0
Ploughing,	—	—	—	—	0 14	4	½	
Harrowing,	—	—	—	—	0	0	9	
Manuring,	—	—	—	—	0	10	0	
Carting home,	—	—	—	—	0	5	4	
						<hr/>		
						1	10	5 ½
						<hr/>		
Clear profit,	—	—	—	—	—	16	8	6 ½
						<hr/>		

## O B S E R V A T I O N S.

I cannot but esteem this trial as decisive. A crop that will pay sixteen pounds an acre clear, on these cold wet loams, with the assistance of a good manuring, is undoubtedly more beneficial than any commonly cultivated by the farmer; and as such I cannot but warmly recommend the plant to all husbandmen, especially those who keep large stocks of hogs, but cannot increase them for want of winter food; and the circumstance of their thriving on these clayey loams so well, on which potatoes will not near equal them, and which are quite improper for carrots, is one of very great importance, and should demand an attention from those, who possess such soils, but cultivate them only in the common manner.

E X P E R I M E N T N<sup>o</sup> 4.

Culture, expences, and produce, of half a rood, field L\*, 1767.

## C U L T U R E.

Trench-ploughed in October, and well water-furrowed. Manured it the first week in January, by means of a hard frost, with three loads of

of compost, consisting of equal parts of coal, ashes, and rotten hog-dung from Bury, and virgin mould mixed together. The beginning of March ploughed it on to five-feet ridges; and harrowing once, planted double rows, at eighteen inches asunder on each ridge, and covered them by another harrowing. Used nine bushels of seed. Hand-hoed the crowns of the ridges before the plants came up, and afterwards gave them two more hand-hoeings, earthing up the rows at the same time; and horse-hoed them four times. Took them up in October: produce seventy bushels, or *per acre* 560. Gave them to a large parcel of lean swine, and estimated the value at  $10\frac{1}{2}d.$  *per bushel*.

EXPENCES.

	£.	s.	d.
Trench-ploughing,	—	—	—
Two other ditto,	—	—	—
Harrowing,	—	—	—
Manuring,	—	—	—
Nine bushels of seed,	—	—	—
Slicing and planting,	—	—	—
Three hand-hoeings,	—	—	—
Four horse-hoeings,	—	—	—
Pulling up the stalks,	—	—	—
Ploughing and picking up twice,	—	—	—
Carting home,	—	—	—
	5	19	7
Rent, &c.	0	17	0
	6	16	7

PRODUCE.

	£.	s.	d.
560 bushels, at $10\frac{1}{2}d.$	24	9	3
Expences,	6	16	7
Profit,	17	12	8
Ploughing,	0	14	$7\frac{1}{2}$
Harrowing,	0	0	9
Manuring,	3	7	2
Horse-hoeing,	0	4	0
Carting home,	0	5	7
	4	12	$1\frac{1}{2}$
Clear profit,	13	0	$6\frac{1}{2}$

## OBSERVATIONS.

I consider this experiment as absolutely conclusive. The profit, clear of thirteen pounds, after paying all expences, including a rich manuring, is an object of the highest importance; and exhibits the culture of Jerusalem artichokes in a point of view, that, I think, cannot fail of striking every considerate reader.

I am very clear, that no other root, *on this soil*, would pay any thing like this profit. The largeness of the crop, and the greatness of the profit, shew also, that the horse-hoeing culture is excellently adapted to the production of this vegetable; and the nature of its growth accounts for this. It is so strongly perpendicular, that the plough, in the operation, has a clear path, and meets with no interruption:—the circumstance, in my humble opinion, that characterises the crops proper for the horse-hoeing culture.

## GENERAL OBSERVATIONS.

The following little table, of the average of the three last trials, will give a pretty clear idea of this branch of husbandry.

EXPENCES.					£.	s.	d.
Experiment N <sup>o</sup> 2,	—	—	—	—	5	7	9½
3,	—	—	—	—	6	13	5½
4,	—	—	—	—	11	8	8½
					23	9	11½

Average, 7*l.* 16*s.* 7½*d.*

PRODUCE.					£.	s.	d.
					<i>Bushels.</i>		
Experiment N <sup>o</sup> 2,	—	—	—	—	380	10	0 0
3,	—	—	—	—	504	23	2 0
4,	—	—	—	—	560	24	9 3
					1444	66	11 3
Average,	—	—	—	—	481	22	3 9

	P R O F I T.				£.	s.	d.
Experiment N <sup>o</sup> 2,	—	—	—	—	13	12	2
3,	—	—	—	—	16	8	6
4,	—	—	—	—	13	0	6
					43	1	3

Average, 10*l.* 15*s.* 5*d.*

It is evident enough from this state of the culture, that the profit of Jerusalem artichokes is extremely great, and undoubtedly ought to become a principal object of British agriculture. I am so strongly convinced of this truth, that I fully designed to enlarge considerably my experiments on them; but leaving the farm prevented the execution: but I shall not, therefore, give up such thoughts: for it is a plant by no means nice in its soil, but thrives on almost any.

Ten pounds an acre clear, from a crop that is the food of cattle, cannot be equalled in common husbandry: for the expenditure of it adds vastly to the value, in raising large quantities of dung. Hogs are the most peculiar stock the farmer keeps: — for oxen, cows, horses, sheep, &c. he provides crops on purpose; but as to swine, they are kept on the offal of the farm, and the leavings of all the other sorts: to which there is no objection, if the maxim was not pursued to the exclusion of a more enlarged plan. They are so profitable an animal, that a farmer should not leave them out of the arrangement of his crops. Clover is their common food in this country in summer; but they have no winter-crop. Now I leave it to the judgment of farmers of penetration, whether it would not be highly adviseable always to have a field, in size proportioned to the farm, of some roots that hogs feed on freely, to enlarge the sphere of winter-keeping? By this means a much greater number might be kept; and those who have experimentally tried the efficacy of hog-dung, as a manure, will know, that to keep large stocks of them is one of the most important objects in husbandry.





EXPERIMENTAL

AGRICULTURE.

BOOK IV.

OF CABBAGES.



# B O O K    I V.

## O F    C A B B A G E S.

**M**Y first hint of cultivating this vegetable in the fields, as food for cattle, was taken from Mr. Randal's *Semi Virgilian Husbandry*. That gentleman mentions, in the warmest terms, the culture of the great *Scotch* sort, and asserts most surprising things of it. I wrote to my seedsman at London, to send me some of this sort of cabbage seed: but his answer was, that he knew of no such cabbage. This was some damp to me: but as the idea in general had struck me, I had determined on cultivating some sort, and wrote to him again for some other sorts; particularly such as would arrive at a very large size. He sent me two kinds, which he called *The Large Battersea*, and *The Large Drum-headed*.

These terms are certainly vulgar; but the botanical distinctions I know not. Afterwards a very ingenious gentleman in Ireland published some experiments on the turnep-cabbage; a sort never cultivated in gardens. Some seed of that I procured as soon as possible, and these are the only sorts I have cultivated, except, accidentally, some common garden kinds; such as *savoy*s, &c. and *cole-seed*, which, from its being of the *Brassica* tribe, should be ranked under this head. These few introductory remarks I thought requisite, that those who have read Mr. Randal's book, whose mentioned success so far exceeded mine, should not attribute my inferiority

feriority to the fault of the plant; as the cabbages I have tried were all of other sorts.

### EXPERIMENT N<sup>o</sup> I.

Culture, expences, and produce, of half a rood, field L\*, 1765.

#### CULTURE.

This piece yielded barley in 1764; the stubble of which was ploughed up in October, and the land water-furrowed. Stirred it again the middle of March; at which time I sowed half a pound of Battersea cabbage-seed on a well-dug bed in the garden. This was for a nursery, to have the plants ready to set out about Midsummer, which was my feedman's direction.

Ploughed the land again in April, and also in May: threw it on to three-foot ridges the first week in June, and manured it with three loads of rotten farm-yard dung: turned it in by reversing the ridges: this was done the 11th. But the season was so remarkably dry, that although I had my land ready, yet I thought it adviseable to wait for rain. The 14th was a continued day of rain; and the 15th I set my plants, one row along the top of each ridge, about twenty inches from plant to plant. But few of them died, notwithstanding the extreme dry weather that followed. The 28th I gave a horse-hoeing to the rows, by turning a furrow from the plants on each side, leaving them upon a narrow slip of land: but that the exposing so much of the earth to the sun might not affect them too much, I directly hand-hoed them, earthing up every plant. They made but a poor appearance for want of rain. July the 10th horse-hoed again, returning the moulds to the rows: the 23d hand-hoed them again. August the 7th horse-hoed the third time: the 13th a very fine rain fell, which gave them presently a new appearance. The 6th of September horse-hoed for the fourth and last time, leaving the ridges in their first form. The cabbages had thriven greatly, and now bid fair for coming to a considerable weight. The beginning of November they were arrived at a full size: I then cut one row, (the piece consisted of three) and weighing them, found their weight 18 cwt. 1 qr. which is *per* acre twenty-two tons: a considerable produce.

The three rows, which weighed together 2 tons 14 cwt. and 3 qrs. were given to four heifers, confined in a yard, with a small quantity of straw. The cabbages lasted them seven weeks: I value the keeping them at 1s. *per* head *per* week, or 28s. which is something better than 6d. *per* cwt. for the crop. They took to them very freely, and eat them heartily.

PROPORTIONS *per* ACRE.

EXPENCES.						£.	s.	d.
Six ploughings,	—	—	—	—	—	0	6	0
Harrowing,	—	—	—	—	—	0	0	1½
Water-furrowing,	—	—	—	—	—	0	0	6
Manuring,	—	—	—	—	—	0	6	10
Expences on the nursery, digging, feed, and sowing,	—	—	—	—	—	0	2	4
Planting,	—	—	—	—	—	0	7	6
Two hand-hoeings,	—	—	—	—	—	0	7	6
Four horse-hoeings,	—	—	—	—	—	0	4	0
Cutting and carting home,	—	—	—	—	—	0	3	8
						<hr/>		
Rent, &c.	—	—	—	—	—	1	18	5½
						0	17	0
						<hr/>		
						2	15	5½
PRODUCE.						£.	s.	d.
22 tons, at 10s.	—	—	—	—	—	11	0	0
Expences,	—	—	—	—	—	2	15	5½
						<hr/>		
Profit,	—	—	—	—	—	8	4	6½
Ploughing,	—	—	—	—	0 10	2½		
Harrowing,	—	—	—	—	0 0	4½		
Manuring,	—	—	—	—	0 7	6		
Carting home,	—	—	—	—	0 6	10½		
Horse-hoeing,	—	—	—	—	0 6	5		
						<hr/>		
						1	11	4½
						<hr/>		
Clear profit,	—	—	—	—	—	6	13	2½

## OBSERVATIONS.

My success in this experiment much exceeds my expectation: for the season was so very dry, that the plants were much stopped in their growth by it; but, nevertheless, the size to which they attained, rendered, in the whole, so considerable a weight as twenty-two tons. But I committed an error in setting the plants so close to each other in the rows; the distance should have been, at least, two feet: for the cabbages quite crowded themselves.

The profit is, however, on this crop, in this bad season, very considerable, and far exceeds that which is commonly gained from the best crops of turneps, and, in one respect, it is peculiarly valuable. Nine fields of turneps, out of ten, this year, failed, either by the seed not coming up, or the fly seizing those which did: so that cabbages escaping both these misfortunes, if the circumstance proves regular, will turn out of particular importance.

But I must, on the contrary, mention a disadvantage attending them. This crop was full grown in November: — many burst in December; — and in January a few, that I kept for the trial of duration, were quite gone and rotten. Here turneps have greatly the advantage, which will keep, in very good perfection, till the end of March on some soils, and on most till the middle of that month. The season in the year that green food, especially for sheep, is most valuable, is the last week in March, all April, and the first ten days in May: but cabbages decaying before turneps, is much against them. I should, however, remark, that this trial decides only for the Battersea sort: there may be other kinds that will stand the winter better.

I was induced to try the crop in the horse-hoeing culture, from the circumstance of its being transplanted; — from the vegetable being of a strong vigorous growth; — and from observing them in gardens generally in rows.

#### EXPERIMENT N<sup>o</sup> 2.

Culture, expences, and produce, of half a rood, field L\*, 1765.

#### CULTURE.

This half rood was cropped with the adjoining lands, with barley, in 1766 the stubble of which was ploughed in in October. In April it was stirred again; another earth in May, and a fourth the beginning of June. Manured it with three loads of town manure, consisting of hog and horse dung, and coal ashes: turned it in by the fifth ploughing, throwing the land on to the common three-feet ridge: this was the 18th of June.

The seed was sown on a piece of good ground in the garden the middle of March: the sort, the large drum-headed cabbage; and the plants set along the ridges, about twenty inches apart, the last week in June. But the drought was such, that they all appeared in a sad condition; so that I had little hope of their living. However, that I might take all chances, I determined to water them, and for that purpose borrowed a water-cart: a pond was in an adjoining field, about 200 yards from the nearest part of the cabbages; the water was distributed in watering-

tering-pots. This recovered many of the plants, but not near all; and the drought continuing through the whole month of July, I found many vacancies in the rows. In that month I hand-hoed the plants, and also in August; and I horse-hoed them four times in all; each time the reverse of the last, drawing the ridges into what are called in Suffolk baulks, and shutting them up. The middle of August rains fell, that much refreshed the cabbages that lived, inasmuch that many of them flourished well. They were at their full size the middle of November, when I began cutting them, and confined two dry cows to them. The weight on the half rood was 1 ton 10 cwt. and they lasted the cows three weeks, with a very little straw besides. This, at 1s. 6d. per cow per week, is 9s. the half rood, and 3*l.* 12s. 6d. per acre; which, for 12 tons, is 6s. per ton.

## EXPENCES.

						£	s.	d.
Five ploughings,	—	—	—	—	—	0	5	0
Harrowing,	—	—	—	—	—	0	0	1½
Water-furrowing,	—	—	—	—	—	0	0	6
Manuring,	—	—	—	—	—	2	6	5
Digging the nursery, seed, and sowing,	—	—	—	—	—	0	2	4
Planting,	—	—	—	—	—	0	7	6
Watering,	—	—	—	—	—	0	8	9
Two hand-hoeings,	—	—	—	—	—	0	7	0
Four horse-hoeings,	—	—	—	—	—	0	4	0
Cutting and carting home,	—	—	—	—	—	0	2	0
						4	3	7½
Rent, &c.	—	—	—	—	—	0	17	0
						5	0	7½

## PRODUCE.

12 tons, at 6s.	—	—	—	—	—	3	12	0
Loss,	—	—	—	—	—	1	8	7½
Ploughing,	—	—	—	—	0	9	2½	
Harrowing,	—	—	—	—	0	0	4½	
Manuring,	—	—	—	—	3	3	0	
Horse-hoeing,	—	—	—	—	0	6	5	
Watering,	—	—	—	—	0	4	0	
Carting home,	—	—	—	—	0	3	9	
						4	6	8½
Total loss,	—	—	—	—	—	5	15	4½



## OBSERVATIONS.

This has proved a very unfortunate crop. The amount of the loss has been owing chiefly to the expence of manuring; all town manure, and laid on in a season that admitted of very little benefit from it. In the value of the cabbages also there is a great variation from the first trial. In feeding these cows, they paid but 6s. whereas in feeding the young cattle, they came to 10s. Such variations must be expected: they are not of great consequence, as all crops vary; and the average of numerous trials will be decisive of the value, however great the variations.

The expence of watering in this experiment is considerable: the latter part of the charge being unusual, I proportion to other work, reckoning 2s. a day for horses, and wear and tear. It is a very troublesome business; and if the cabbage-field was far from a pond, would be sufficient to damp the culture: but in such extreme dry seasons as this, I know not how it can be avoided\*. It is of such importance, that I am clear of the propriety of having the land ready for the cabbages as early in June as possible, and to extend the planting season to the end of July: in which two months, all wet times should be selected for planting; and this is the conduct which I am determined to pursue in future.

The duration of this cabbage is not longer than that of the Battersea. I kept some of them, for the trial, till the beginning of February; but their outsides were quite rotten: they ought all to be consumed by the end of January. This is a very unfavourable circumstance; for turneps much exceed them. Some of these cabbages came to a large size. I weighed two of 16 lb. each.

EXPERIMENT N<sup>o</sup> 3.

Culture, expences, and produce, of half a rood, field L\*, 1766.

## CULTURE.

First ploughed in autumn 1765: stirred it again the first week in March, and gave a third ploughing in April: a fourth in May; and manured it with three loads of rotten farm-yard compost the first week in June, turning it in by the fifth earth, throwing the land on to the four-foot ridge, and arching them up by the sixth ploughing.

This was written in May 1766.

The feed was sown as last year in the garden in March; the fort the Battersea; a piece of clean rich earth being chosen for the purpose.

I began planting the 13th of June; one row on each ridge, and the plants two feet asunder: and the season was, upon the whole, so various, neither wet nor dry three days together, that I was under no apprehensions of the plants living. Nor was I mistaken; for I do not think I lost five in one hundred, and I had their vacancies filled from the nursery. As soon as the plants were pretty strong, clearly recovered from planting, they were hand-hoed; which operation was twice repeated during the season, to keep the ridges clean from weeds, which arose very quick. They were also horse-hoed four times; the last left the ridges in their first form. Nothing could thrive better than these cabbages: they spread vastly, joined close in the rows, and, after the last horse-hoeing, quite shut out the plough from the intervals. The beginning of November they were full grown, when I began to cut them for two working oxen: and weighing, to discover the product, one row, the third of the piece, weighed 1 ton 10 cwt. which is 36 tons *per acre*: a very considerable produce. The half rood yielded 4 tons 10 cwt. which lasted the two oxen four weeks; and also kept two dry cows three weeks, and three head of young cattle a fortnight.

						£.	s.	d.
The oxen, at 2s.	—	—	—	—	—	0	16	0
The cows, at 1s. 6d.	—	—	—	—	—	0	9	0
The young cattle, at 1s.	—	—	—	—	—	0	6	0
						<hr/>		
						1	11	0
						<hr/>		
Which is <i>per acre</i> ,	—	—	—	—	—	12	8	0

						£.	s.	d.
EXPENCES.								
Six ploughings,	—	—	—	—	—	0	6	0
Harrowing,	—	—	—	—	—	0	0	1½
Water-furrowing,	—	—	—	—	—	0	0	6
Manuring,	—	—	—	—	—	0	6	6
Expences on nursery,	—	—	—	—	—	0	2	6
Planting,	—	—	—	—	—	0	5	6
Two hand-hoeings,	—	—	—	—	—	0	5	0
Four horse-hoeings,	—	—	—	—	—	0	3	0
						<hr/>		
Carried over,	—	—	—	—	—	1	9	1½

							£.	s.	d.
Brought over,	—	—	—	—	—	—	1	9	1½
Cutting and carting home,	—	—	—	—	—	—	0	6	0
							1	15	1½
Rent, &c.	—	—	—	—	—	—	0	17	0
							2	12	1½
P R O D U C E.							£.	s.	d.
36 tons, at 6s. 10½d.	—	—	—	—	—	—	12	8	0
Expences,	—	—	—	—	—	—	2	12	1½
Profit,	—	—	—	—	—	—	9	15	10½
Ploughing,	—	—	—	—	—	0 14 4½			
Harrowing,	—	—	—	—	—	0 0 4½			
Manuring,	—	—	—	—	—	0 7 6			
Horse-hoeing,	—	—	—	—	—	0 4 10			
Carting home,	—	—	—	—	—	0 11 3			
							1	18	4
Clear profit,	—	—	—	—	—	—	7	17	6½

## O B S E R V A T I O N S.

This is a noble crop, and much exceeds any thing that can be done with turneps; besides, the particularly valuable circumstance of being gained from land much too heavy and wet for that root. It appears from this crop, that four-foot ridges are very proper sized ones for planting cabbages on: I am inclined to think them properer than three-foot ones. The land is left by the cabbages in most excellent order, perfectly clean, and in good tilth. But what is an object of much greater importance, is, the quantity of dung to be raised by the expenditure of the crop: 36 tons *per* acre, used in the farm-yard, will certainly raise large quantities, and thereby work a great improvement in a farm.

These cabbages, like the preceding crops, would not last longer than January, which is a circumstance, in one respect, very unfavourable; but it by no means excludes so profitable a crop from cultivation. They should be planted in a quantity proportioned to the cattle, and to the turnep crop; so that they may be applied to maintaining the stock till Christmas or after, and the turneps then begun, to carry them on to March. Near eight pounds an acre are so considerable a clear

clear profit, that it would answer to the husbandman to have a field of them on this plan every year. Another point to be considered is, the small quantity of turnep land possessed by many farmers. Now this culture of cabbages, for all their stock till the middle or end of January, would reduce the want of turneps to two months; so that one acre would answer the purpose of six.

All cattle appear extremely fond of cabbages; and I found, by a particular trial, that they preferred them to turneps: for I ordered a basket of the latter to be carried to the cattle that eat this crop, while they were feeding on the cabbages; but, except a bite or two, they would not touch them, but finished their cabbages very eagerly.

#### EXPERIMENT N<sup>o</sup> 4.

Culture, expences, and produce, of one acre, field T\*, 1766.

#### CULTURE.

In autumn 1765, I read Mr. Wynn Baker's experiments on the turnep-cabbage, which seemed so particularly important, that I immediately determined to cultivate so useful a plant. The circumstance of lasting so late in the spring, when the turneps are rotten, or run to seed, appeared to me decisive, and to remedy at once the evil of the sorts which I had hitherto used. I bought half a pound of the seed in February; — sowed it on a well-dug bed in the garden the first week in March, and I had the satisfaction to find the plants rise very favourably.

This acre yielded wheat and barley in divisions, in complete management, respecting both tillage and manure. The stubble was ploughed up in October on to common three-feet ridges, and the land water-furrowed. Stirred it again the beginning of March, reversing the ridges. Ploughed them down in April: in May gave the fourth earth, throwing it on to four-feet ridges. The beginning of June manured it with fifteen loads of rotten farm-yard dung. The second week of that month turned in the dung, by arching up the ridges. Harrowed them twice with the drill-harrows: and the 20th, &c. planted a single row of turnep-cabbages along the top of each ridge, at the distance of about two feet from each other. The succeeding weather being showery, I lost scarce any of them. The beginning of July, I hand-hoed the plants; and soon after horse-hoed them for the first time, turning a furrow from the rows on each side, and throwing up a small ridge in the middle of each interval. Horse-hoed thrice more after this; each time the reverse of the former: and also hand-hoed the plants again. They made a very beautiful appearance throughout the season; were of a fine vigorous growth, and healthy verdure. In November I water-furrowed

furrowed the land, to lay it as dry as possible for the winter, determining to keep the crop very late into the spring, that I might know its merit at the critical time of the year, when turneps were done with. I remarked, that the leaves turned yellow, and many dropt off in November and December; but in March they came again very luxuriantly: nor did the frosts, though some were very severe, affect them the least. I marked some square perches the middle of April, in the best, middling, and worst part of the acre, that I might know the product at that season.

					T. C. Q.
N <sup>o</sup> 1, Weighed,	—	—	—	—	0 3 0
2,	—	—	—	—	0 2 3
3,	—	—	—	—	0 2 2

Average, 2 cwt. 3 qrs. which is 22 tons *per* acre.

The 5th of April, I began to use them for 80 sheep with lambs. I cut and carted them on to a little grass field, where the sheep were confined, and they lasted them till the 10th of May, being just five weeks. I reckon the value of keeping the sheep (many of them had double lambs) to be 6*d.* a week. Nor is this estimation at all extravagant, considering the five weeks here mentioned, being the most critical in the whole year. The amount at that rate is just 10*l.* or 9*s.* a ton for the crop.

						£.	s.	d.
EXPENCES.								
Five ploughings,	—	—	—	—	—	0	5	0
Harrowing,	—	—	—	—	—	0	0	3
Water-furrowing,	—	—	—	—	—	0	0	9
Manuring,	—	—	—	—	—	0	4	3
Expences on nursery,	—	—	—	—	—	0	3	0
Planting,	—	—	—	—	—	0	5	0
Three hand-hoeings,	—	—	—	—	—	0	6	0
Four horse-hoeings,	—	—	—	—	—	0	3	0
Cutting and carting,	—	—	—	—	—	0	3	8
						<hr/>		
						1	10	11
Rent,	—	—	—	—	—	0	17	0
						<hr/>		
						2	7	11
						<hr/>		

P R O D U C E.						£. s. d.		
22 tons eat by sheep,	—	—	—	—	—	10	0	0
Expences,	—	—	—	—	—	2	7	11
Profit,	—	—	—	—	—	7	12	1
Ploughing,	—	—	—	—	0 12 2½			
Harrowing,	—	—	—	—	0 0 9			
Manuring,	—	—	—	—	0 4 8			
Horse-hoeing,	—	—	—	—	0 4 10			
Carting,	—	—	—	—	0 6 10			
						1	9	3½
Clear profit,	—	—	—	—	—	6	2	9½

O B S E R V A T I O N S.

I never registered any experiment that gave me more satisfaction than this; and I cannot delay a moment expressing my acknowledgements to the very ingenious cultivator, who introduced so excellent a plant, for the advantages which, I am confident, the whole kingdom will reap from its use. It answers the description very faithfully; particularly in the circumstance of being impenetrable to frost, and lasting throughout the spring, when all other winter food is gone. In this respect it is invaluable, and it does it to perfection. The root, or rather the enlargement of the stalk, holds quite sweet and firm throughout the spring. I kept a few plants till the 20th of May, and they were then as sweet and good as two months before. I shall, therefore, venture to assert, that the turnep-cabbage is admirably adapted to the spring-food for sheep, when all other sorts are gone. Turneps, it is well known, will last in no such season: and rye, which farmers sow for this purpose, yields so small a quantity of food, that the practice scarcely pays expences. Let any one, who has experienced the difficulty of keeping sheep late in the spring reflect, if a crop that will keep 80 sheep and their lambs for five weeks, at this season, to every acre, is not of vast importance! Ten acres feed 800 sheep: what an acquisition would this be to a vast many farms!

But this great convenience of keeping sheep in the spring, to the preservation of the meadows and pastures that are designed for hay, is not the only advantage of this crop: the mere profit of it, viz. 6*l.* 2*s.* 9*d.*

*per acre*, is an object of very great consequence, much exceeding any thing ever made by turneps, and beyond what one crop of wheat in an hundred pays. A fallow crop, that receives so much tillage, pays for manuring,—leaves the land in most excellent order,—keeps sheep when there is no other food,—and raises large quantities of dung, by enabling the farmer to maintain so much more stock than he could otherways do. — A crop, I say, that effects all this, must evidently be one of the most profitable that can be introduced, and well deserves to be universally introduced.

The reader, however, should not forget this acre being cropped with wheat, in perfect management, in 1765, which left the soil in great heart. This is a proof that the turnep-cabbage requires good husbandry, or land naturally excellent: it well deserves it.

#### EXPERIMENT N<sup>o</sup> 5.

Culture, expences, and produce, of half an acre, field M\*, 1766.

#### CULTURE.

Yielded horse-hoed pease in 1765. Ploughed the land in October: stirred it again the beginning of March. Gave it the third earth in April, and harrowed it. Ploughed it, for the fourth time, the middle of May. The beginning of June threw it on to three-feet ridges: manured it with fifteen loads of rotten farm-yard dung. Turned it in, by reversing the ridges, the 17th; and the next, and following days, planted one row of turnep-cabbage (from a nursery in the garden sown in March) along each ridge; the plants two feet distant. Hand-hoed them twice, and horse-hoed four times during the season: but the plants grew so fast, that I was forced to finish the horse-hoeing in two months from planting. Nothing could make a better appearance throughout the season than this crop; the plants almost every where joined from row to row, and their verdure was clear and healthy. I preserved them for the spring-feed of sheep. The beginning of March marked three square perches, in the best, middling, and worst parts of the piece, and weighing the produce found it;

			T.	C.	Q.
N <sup>o</sup> 1,	Two cwt. and $\frac{1}{2}$ , or <i>per acre</i> ,	—	20	0	0
2,	Two cwt. and $\frac{1}{4}$ , or	—	18	0	0
3,	Two cwt. and 7 lb, or	—	16	10	
Average, 18 tons 3 cwt.					

I began to cut them for 80 sheep the 14th of March, and they kept them fifteen days, which, at *6d. per sheep per week*, comes to *4l. 6s. 0d.* or *per acre 8l. 12s. 0d.* which is something better than 10s. a ton.

EXPENCES.						£.	s.	d.
Six ploughings,	—	—	—	—	—	0	6	0
Harrowing,	—	—	—	—	—	0	0	3
Manuring,	—	—	—	—	—	0	8	6
Expences in nursery,	—	—	—	—	—	0	3	3
Planting,	—	—	—	—	—	0	7	0
Twice hand-hoeing,	—	—	—	—	—	0	8	0
Four horse-hoeings,	—	—	—	—	—	0	4	0
Cutting and carting,	—	—	—	—	—	0	3	0
						2	0	0
Rent, &c.	—	—	—	—	—	0	17	0
						2	17	0

PRODUCE.						£.	s.	d.
18 tons 3 cwt. fed with sheep,	—	—	—	—	—	8	12	0
Expences,	—	—	—	—	—	2	17	0
Profit,	—	—	—	—	—	5	15	0
Ploughing,	—	—	—	—	—	0	14	7½
Harrowing,	—	—	—	—	—	0	0	9
Manuring,	—	—	—	—	—	0	9	4
Horse-hoeing,	—	—	—	—	—	0	6	6
Carting home	—	—	—	—	—	0	5	7
						1	16	9½
Clear profit,	—	—	—	—	—	3	18	2½

## OBSERVATIONS.

The profit of near four pounds an acre, from a crop that not only pays the expence of an ample manuring and much tillage, but also leaves the ground in most excellent order, is vastly more considerable

[ N n 2 ]

than



than ever is made of turneps. That root is not esteemed profitable by any farmer in the immediate balance of the account. They look to its consequences for the advantage of the culture: they substitute them in the room of a fallow, which yields nothing, but is very expensive; and the consumption of the crop enables them to keep large stocks of cattle, and thereby raise much dung for the general improvement of the whole farm. These benefits are so great, that they sow many turneps under the certainty of even *losing* by them the first year.—But how important must be a plant, that is attended with all these favourable circumstances, and several others besides, and at the same time yields a clear profit of four pounds an acre? This is the case with the turnep-cabbage. The advantages attending the culture, I am confident, will prove of the utmost consequence; and that circumstance in particular, of keeping sheep through the latter part of the spring, is a point that renders it invaluable.

From viewing the cabbages of this crop and those of the last experiment, I am inclined to believe that three feet distance is sufficient from row to row. The plants in the last registered trial are larger than in this; but then the soil was in greater heart: and from the growth I judge, that, if all circumstances were equal, the crop of three-feet ridges would exceed that of four-feet ones. Mr. Baker recommends five feet. I can determine for no soil but my own: but if I was to cultivate the crop on any other varieties of land, I would never allow any such distance.

#### EXPERIMENT N<sup>o</sup> 6.

Culture, expences, and produce, of six acres, field W 1766.

#### CULTURE.

This field was cropped this year with horse-hoed oats; and having thrown up a ridge in each interval the middle of June, I used a large parcel of turnep-cabbage plants, which I had to spare, in setting a row along the top of each of these ridges; which work I performed the last fortnight of that month, and the first week of July; and the field had received no manure of a long time, and the tillage was not considerable; which circumstances, together with much poverty of soil, prevented the plants from making any great appearance. The showery weather, however, gave life to them all. The latter end of July I hand-hoed them; which operation was repeated in August. The oats being reaped

reaped the first week in September, I immediately horse-hoed the cabbages, and again the middle of that month: this was all the culture they had. In February and March I weighed many square perches in different parts of the field, and found the average weight, *per* acre, to be 3 tons 10 cwt. They were given to oxen, hogs, young cattle, and sheep. Particular minutes were taken of expenditure, and the value *per* ton turned out as follows:

						£.	s.	d.
By sheep,	—	—	—	—	—	0	8	0
By working oxen,	—	—	—	—	—	0	5	0
By young cattle,	—	—	—	—	—	0	4	9
By swine,	—	—	—	—	—	0	5	9

Average, *ol.* 5s. 11d.

						£.	s.	d.
EXPENCES.								
Nursery,	—	—	—	—	—	0	15	0
Planting,	—	—	—	—	—	1	10	0
Twice hand-hoeing,	—	—	—	—	—	1	8	0
Two horse-hoings,	—	—	—	—	—	0	8	0
Cutting and carting,	—	—	—	—	—	0	3	6
						4	4	6

						£.	s.	d.
PRODUCE.								
21 tons, at 5s. 11d.	—	—	—	—	—	6	4	3
Expences,	—	—	—	—	—	4	4	6
Profit,	—	—	—	—	—	1	19	9
Horse-hoeing,	—	—	—	—	—	0	2	0
Clear profit, <i>ol.</i> 6s. 3½d. <i>per</i> acre,	—	—	—	—	—	1	17	9

## OBSERVATIONS.

From the appearance of the plants in this field, I did not expect the crop would pay the expences : but therein I was mistaken ; for 6*s.* 3½*d.* *per* acre profit is something, when raised by a plant that is food for cattle. But the smallness of the product, compared with other crops of turnep-cabbage, shews plainly, that such indifferent husbandry, on poor land, will never do for this plant. Three tons and a half *per* acre are a produce not to be named of a crop that will give above 20 tons. Whoever, therefore, may be inclined to cultivate it, I should certainly advise to take warning by this experiment, and on no account depend on the product of crops that do not receive complete culture ; that is, good tillage, and ample manuring. No crop will pay for them better ; and on sheep-farms none half so well.

EXPERIMENT N<sup>o</sup> 7.

Culture, expences, and produce, of half a rood, field L\*. 1766.

## CULTURE.

I trench-ploughed this rood in October 1765, designing it for beans in complete management. In the winter it was manured with four loads of rotten farm-yard dung. The beginning of March ploughed it. The middle of April manured it with two loads of town-manure, coal-ashes, mortar-rubbish, and horse-dung mixed together : turned it in by the third ploughing the same month. Stirred it again in May. The beginning of June ploughed it on to four-feet ridges. Manured them with three bushels of malt-dust strewed along the crowns of the ridges. Arched them up by the sixth ploughing : harrowed once, and planted a single row of turnep-cabbages, from a nursery in the garden, along the top of each ridge, two feet from plant to plant : this was done the 21<sup>st</sup>. The favourableness of the weather kept most of them alive ; not five in an hundred, I believe, died. They were hand-hoed twice, and horse-hoed four times. Nothing could flourish more luxuriantly than this crop, which made a beautiful appearance. In March I weighed one row, (the piece contained three) the amount 1 ton, 3 cwt. 1 qr. This is *per* acre 28 tons. I was disappointed in this produce, expecting 35 at least : but I apprehend the nature of the plant will not allow of any

any such growth. They were given to the sheep in April, and paid 8*s.* 6*d.* per ton.

## EXPENCES.

						£.	s.	d.
Trench-ploughing,	—	—	—	—	—	0	2	0
Five other ditto,	—	—	—	—	—	0	5	0
Water-furrowing,	—	—	—	—	—	0	1	0
First manuring,	—	—	—	—	—	0	13	0
Second ditto,	—	—	—	—	—	1	8	5
Third ditto,	—	—	—	—	—	0	14	0
Nurfery,	—	—	—	—	—	0	4	0
Planting,	—	—	—	—	—	0	5	6
Twice hand-hoeing,	—	—	—	—	—	0	8	6
Four horse-hoeings,	—	—	—	—	—	0	3	0
Cutting and carting,	—	—	—	—	—	0	4	8
						4	9	1
Rent, &c.	—	—	—	—	—	0	17	0
						5	6	1

## PRODUCE.

						£.	s.	d.
28 tons, at 8 <i>s.</i> 6 <i>d.</i>	—	—	—	—	—	11	18	0
Expences,	—	—	—	—	—	5	6	1
Profit,	—	—	—	—	—	6	11	11
Ploughing,	—	—	—	—	0 17	0	½	
Harrowing,	—	—	—	—	0 0	4	½	
First manuring,	—	—	—	—	0 10	0		
Second ditto,	—	—	—	—	0 14	4	½	
Third ditto,	—	—	—	—	0 3	3		
Horse-hoeing,	—	—	—	—	0 4	10		
Carting home,	—	—	—	—	0 8	9		
						2	18	7½
Clear profit,	—	—	—	—	—	3	13	3½

## OBSERVATIONS.

This experiment was not formed according to the nature of the plant, at least from the remarks which I have made on it. It is not capable of growing to a large size: I have never seen one that weighed more than 11 lb. Had this manure been doubled, I question whether it would have added half a pound to the weight of each plant: therefore, for profit, common good husbandry exceeds such a complete culture as this. Good tillage, with 25 or 30 loads *per* acre of rotten farm-yard dung compost, are sufficient for it. However, this trial shews, that the plant will come to 28 tons *per* acre, which is a very great produce in April and May, when the farmer has nothing else on his ground for his sheep. The clear profit also of three guineas and an half, after paying such expences, is very great. Turneps can never be carried to a product of 12%. They will very seldom *produce* so much as the *clear profit* of this trial.

## GENERAL OBSERVATIONS ON these EXPERIMENTS.

I shall here pursue the method I have before followed, and lay the particulars of the preceding trials before the reader.

EXPENCES.				£.	s.	d.
N <sup>o</sup> 1.	Battersea,	—	—	4	6	9½
2.	Drum-headed, manured with town	—	—	9	7	4½
	dung,	—	—			
N <sup>o</sup> 3.	Battersea,	—	—	4	10	5½
4.	Turnep-cabbage,	—	—	3	17	2½
5.	Ditto,	—	—	4	13	9½
6.	Ditto among oats,	—	—	0	14	5
7.	Ditto complete treatment,	—	—	8	4	8½
				35	14	8½

Average, 5*l.* 2*s.* 1½*d.*

Ditto, exclusive of N<sup>o</sup> 6. 5*l.* 16*s.* 8½*d.*

## P R O D U C E.

			Tons.		£.	s.	d.
N <sup>o</sup> 1.	Battersea,	—	—	22	—	11	0 0
2.	Drum-headed,	—	—	12	—	3	12 0
3.	Battersea,	—	—	36	—	12	8 0
4.	Turnep-cabbage,	—	—	22	—	10	0 0
5.	Ditto,	—	—	18	—	8	12 0
6.	Ditto,	—	—	3 $\frac{1}{2}$	—	1	0 8
7.	Ditto,	—	—	28	—	11	18 0
				<u>141<math>\frac{1}{2}</math></u>	—	<u>58</u>	<u>10 8</u>
Average,	—	—	—	20	—	8	7 3
Ditto, exclusive of N <sup>o</sup> 6.	—	—	—	23	—	9	11 8

## P R O F I T   A N D   L O S S.

					£.	s.	d.
N <sup>o</sup> 1.	Battersea; Profit,	—	—		6	13	2 $\frac{1}{2}$
3.	Ditto,	—	—		7	17	6 $\frac{1}{2}$
4.	Turnep-cabbage,	—	—		6	2	9 $\frac{1}{2}$
5.	Ditto,	—	—		3	18	2 $\frac{1}{2}$
6.	Ditto,	—	—		0	6	3 $\frac{1}{2}$
7.	Ditto,	—	—		3	13	3 $\frac{1}{2}$
					<u>28</u>	<u>11</u>	<u>4</u>
N <sup>o</sup> 2.	Drum-head, Loss,	—	—		5	15	4 $\frac{1}{2}$
					<u>22</u>	<u>15</u>	<u>11<math>\frac{1}{2}</math></u>
Profit <i>per</i> acre,	—	—	—	—	3	5	1
Ditto, exclusive of N <sup>o</sup> 6.	—	—	—	—	3	14	11 $\frac{1}{2}$

These tables give a general idea, but not an accurate, particular one. The product and profit are varied by some circumstances that want explanation. The two first numbers are in the year 1765, that is the severe drought, which is the reason of the products being no greater. The great loss on N<sup>o</sup> 2. is owing to the expence of manuring with

purchased dung, as appears in the table of expences: and the product, in money, as well as profit, varies with the application of the crop.

The various rates *per* ton are as follow :

					£.	s.	d.
N <sup>o</sup> 1.	Battersea; eat by heifers,	—	—	—	0	10	0
2.	Drum-headed; cows,	—	—	—	0	6	0
3.	Battersea; oxen, cows, and young cattle,	—	—	—	0	6	10½
4.	Turnep-cabbage; sheep,	—	—	—	0	9	0
5.	Ditto, ditto,	—	—	—	0	10	0
6.	Ditto, by sheep,	—	—	—	0	8	0
	By oxen,	—	—	—	0	5	0
	By young cattle,	—	—	—	0	4	9
	By swine,	—	—	—	0	5	9
7.	Ditto; sheep,	—	—	—	0	8	6
					3	13	10
Average.	—	—	—	—	0	6	4½
Ditto by cattle,	—	—	—	—	0	6	4½
Ditto by sheep,	—	—	—	—	0	8	11

The difference of these rates is easily accounted for: the sheep are fed at a season when there is no other food for them, and the price *per* week consequently beyond the proportion of that of beasts that are fed at a season when other kinds of winter food are to be had, as well as cabbages.

But these prices are both of them considerable, and shew that cabbages are a food admirably adapted to all sorts of cattle. Turneps will yield no such value.

Relative to the large garden cabbages, I must observe, that the preceding experiments give us great reason to think their weight, with good management, and in favourable seasons, will be very considerable. I have no doubt but they may be carried from thirty-five to forty tons *per* acre: but as they will not last longer than January, whoever cultivates them should plan his measures accordingly. The produce and profit is so very considerable, that they should by no means be slighted on that account. The clear profit of 6*l.* 13*s.* 0*d.* and 7*l.* 17*s.* 0*d.* *per* acre, are not to be disregarded, because gained from a crop that must be finished in January. It is far superior to any thing that is ever gained

from turneps, and at least equal to the profit of three good crops of wheat on the same land: the importance, therefore, of this branch of the cabbage culture is so great, that I shall not hesitate earnestly to recommend it.

But ~~the merit~~ of the turnep-cabbage is of a very different nature: ~~it chiefly~~ consists in its duration late in the spring. The utmost efforts of the farmer can make his turneps last no longer than the end of March; and as few grasses commonly used are then ready to receive the sheep, they are kept on the meadows and pastures, to the irreparable damage of the ensuing crop of hay, or else all the wheat on the farm eaten down; not because it is so luxuriant, as really to want it, but because the farmer has nothing else for his flock: and I have many times known both these cases unite in the same farm. If they are guarded against, it is at an expence of hay, which deprives the farmer of half the advantage he ought to receive from his sheep, and the food at the same time not good for ewes that give milk.

It is here, therefore, that the turnep-cabbage comes in with such peculiar advantage: it lasts, in full perfection, quite through the spring. A farmer may absolutely depend on it for yielding his sheep excellent food, without any damage to his land, to the middle of May: so that all his stock may be taken from turneps, and put directly to turnep-cabbage about the middle of March, and kept on that food till the turning out to grass. The acquisition of a plant that will take the sheep, &c. at such a season, and carry them through the most pinching time in the whole year, I must be allowed to think of uncommon importance, and such as fairly and really demands a greater attention than, I believe, has yet been given it in this kingdom. — The culture of none of the cabbages is at all difficult, or beyond the sphere of the common farmer. He has no implements to use in it, except such as he every day uses in his common husbandry; nor does it require more attention than he gives to many other crops. I cannot but think, therefore, that so excellent a vegetable will, by degrees, become more common. I am so fully convinced of its merit, that I shall certainly cultivate it regularly for spring sheep-feed.

A great degree of attention should always be given to those crops that do not exhaust the land; — whose culture cleans it, and whose consumption raises dung. Without specifying any other particulars, we may absolutely determine, that such crops are always highly beneficial. What amazing quantities of valuable manure might be raised by means of a proper succession of winter food for cattle: the large garden cabbages to last the cattle (shut up in a farm-yard) to the middle of January; — the turneps from thence to the end of March; — and the turnep-cabbage from thence to the middle of May. By such husbandry, with plenty of litter, the yard would be a mountain of dung.



But there is another circumstance, in the culture of cabbages, of peculiar importance. From the preceding experiments it is very evident, that the clayey loams are very well adapted to the production of this plant: probably they are more so than dryer lands. -- Now this opens a new world to the cultivators of heavy lands, who, from that circumstance, are shut out from the advantages of the turnep culture, and forced to depend (in winter) on hay, straw, or after-grass. What a benefit, to be able to equal, and even exceed, the turnep-land farmer in the winter food of cattle!

The late duration of the turnep-cabbage causes one difficulty, which should be mentioned. It is the season of sowing the succeeding crop: this is too late for any common spring corn. In this case I shall propose two methods that will take in all sorts of land. *First*, On soils that will yield buck-wheat sow that grain; which should not be ventured in the ground before the 15th of May. It is an excellent crop, and will pay as well as any other spring-corn. *Secondly*, On soils that will not do for buck-wheat, appropriate a field to the cabbages alone. Plant them every year in the same field, with only the precaution of reversing the ridges every year, so that the rows this year may be where the intervals were last. I dare engage that these methods will be found totally to remove the objection, without any attendant inconveniences.

EXPERIMENTAL  
AGRICULTURE.  
BOOK V.  
OF ARTIFICIAL GRASSES.



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B O O K V.

O F A R T I F I C I A L G R A S S E S.

**I** Use this title, not because it is accurately expressive; but because it is generally understood :—my trials extend no farther than the following plants :

1. Clover.
2. Trefoile.
3. Lucerne.
4. Sainfoine.
5. Burnet.

## CHAP. I.

## OF CLOVER.

**I**T is now above a century since this grass was first introduced in England: it has spread over many of our counties, and become common husbandry—yet is it used by the farmers, with the same confidence as wheat, barley, &c. and not confined to the fields of gentlemen and the curious. It is one of the grand pillars of British agriculture; insomuch that vast numbers of our husbandmen would be totally unable to pay their rents without the use of it. It yields crops of the most beneficial nature.—is the occasion of raising great quantities of rich manure, and prepares admirably for corn. The virtues of such a vegetable must be too great to be in the least disputable. It is said, I know not on what authority, to have been introduced among us by Sir Richard Weston—if so, his name deserves to be much more revered than those of the greatest heroes, the most celebrated conquerors, or the most distinguished philosophers that do honour to Britain. He has given bread to millions; whereas, it is much to be questioned whether the genius of Newton himself, sublime as it undoubtedly was, has been of one fortieth part of the utility to mankind, that this vegetable, for so many ages neglected, has been of to his countrymen.

But one circumstance concerning the introduction of clover is, I must confess, mysterious to me. Sir Richard Weston travelled through Flanders with the eye of an attentive penetrating man: on his return he published his *Discourse on Flanders Husbandry*; from that period many of our writers on the subject of agriculture, date the introduction of the plant: but certainly the husbandmen of that age were much more docile animals than the present race—it was an absolute phenomenon to see the farmers going to work with the culture of a new vegetable from the publication of a book. I will venture to assert that forty Sir Richards would not now be able to spread a new branch of husbandry, were they possessed of more than angel pens. For a proof, take this very vegetable—I am told it is at present utterly unknown by the common farmers in many counties of this Kingdom: this is a most surprising circumstance with a plant that was, no longer than about a century ago, first introduced by a book. If any publication could have such a great effect; strange, indeed, if so extensive a culture as the present should not have power to extend it over the remainder of the island. The general practice of a single county has an hundred times more probability of becoming

becoming universal, than the publication of forty thousand volumes of rendering it so. Let any one reflect on the extreme backwardness of the common farmers to adopt a new culture, however promising, and he will, I doubt not, allow the great improbability of clover being introduced among such numbers of common farmers in so few years after the publication of Sir Richard's book, as our accounts teach us to believe; for many other works of that age, at no long remove from his, speak of clover as no very uncommon article of culture. That his book might easily introduce the culture among gentlemen I readily allow, and so excellent a plant would, by that means, by degrees spread: but then a much longer period would probably be necessary for its becoming common, however beneficial the practice might be found.—After all, I venture these but as doubts, wishing that those who have a better opportunity than myself of consulting our old writers on husbandry would accurately examine the fact, and state the progress of the culture of this admirable plant which is of such immense consequence to Britain. \*

But whether clover has been cultivated for many ages, or but a few years, is not a matter of great consequence, since the world has not been favoured with the register of numerous, distinct, clear, or decisive experiments on it: indeed our books of husbandry, however they may praise it, yet are barren enough of real and important trials. Here and there, we meet with a scattered experiment or two, to prove the great merit of the culture; but they are generally so extravagantly successful that they can only be the result of trials on soils most uncommonly rich and fertile: such experiments are not of that great utility as one would suppose the authors estimated them, by inserting no others. The grand utility of experiments in agriculture is the *enabling every man to pronounce the degree in which any culture is useful or detrimental under given circumstances*; but then all methods, and all degrees of success must be included: for a farmer's once in an age gaining a wonderful crop of any thing is not of so much consequence as the register of his whole experience, which gives an average of many circumstances, always peculiarly valuable. But I know not three real and satisfactory trials on clover in all the volumes I have read: so that our knowledge of it is merely general.—*It is beneficial*, we say: but to what degree?—and in what peculiar circumstances?—Our knowledge will not tell us this.

But let not the reader imagine that I have the most distant thought of my work's supplying the deficiencies of all other writers. Very far from it. I give the register of my experience, but that experience is confined to the limits of my farm:—and I pretend to speak only of the soils which compose it—so that my business has been something like that of an eastern astronomer, who has a certain space in the heavens delineated for his peculiar observation, all the rest being divided among others;—accurate as his observations may be

be, yet they are confined. But then the aggregate of all, gives that *general* knowledge which is the standard of the science. Thus I pretend to nothing more than examining my division of soil; I have no business with those of my neighbours. If others are equally industrious in their paths, the art will become the more scientific.

Among the following experiments on clover, the reader will meet with several that vary pretty considerably from any that have yet been published. I have examined the vegetable with a more particular attention than others, who either had not inclination or time for their remarks. The degree of its merit on my soils will be found with tolerable accuracy; but I should remark, that my leaving the farm so soon broke into my schemes greatly, and prevented me from pursuing some ideas, which a few trials out of the common road had raised. Another course on the same land would have enabled me to speak more decisively on several points.

Previous to the trial, I should remark, that the common culture of clover in this neighbourhood varies but slightly. Its degrees of merit depend on little besides the course of crops in which it is introduced; that is, whether it is sown with the first, second, or third crop after the fallow; the last is very bad husbandry; the second is far from good; the first, the true culture, and is often practised by many of our farmers; especially when turnips are the fallow. Some few sow it over wheat in the spring; but it is not very common, and then but seldom depended on for a full crop, to be succeeded by wheat, which is one of the grand characteristicks of the clover husbandry. They use it both for mowing for hay, and seed: and also for feeding. They both mow for hay and feed off the first growth; seed is always the second, if taken at all.

## S E C T. I.

### The CULTURE and PRODUCE.

My experiments on clover not being of the same nature as those on corn, it is not requisite to arrange them under the three heads of culture in the old method, in the new, and the comparison. Great as my faith once was in the writers on agriculture, I never was able to swallow so large a dose as the horse hoeing culture of clover. I have therefore united all methods of culture in one section, to avoid an affectation of divisions. When first I farmed, not being provided with the clover that was requisite, I hired once or twice of my neighbours. As I kept an exact register of the cattle such fields maintained, I insert them among the following trials.

EXPERIMENT N<sup>o</sup> I.

Culture, expences, and produce, of 2 acres, field P, 1763.

## CULTURE.

The clover of this crop was sown among barley in the spring of 1762, the chief of the field was under clover, but as several parts of it were differently managed, it is absolutely necessary to divide it accordingly, each being a distinct experiment. These acres I assigned to yielding hay. They were mown twice, the first time in June, and the second, the first week in September. The produce of the two was five tons of hay, dry, weighed in the following winter.

## EXPENCES.

	£.	s.	d.
1 ½ peck of seed at 25s. a bushel,	0	9	4
Mowing, making and carting,	0	9	0
Sowing,	0	0	6
	0	18	10
Rent, &c.	1	14	0
	2	12	10

## PRODUCE.

	£.	s.	d.
Five tons of hay at 30s.	7	10	0
Expences,	2	12	10
Profit at 2l. 8s. 7d. per acre,	4	17	2
Carting the hay, at 7½d.	0	2	5
Clear profit 2l. 7s. 4½d. per acre,	4	14	9

## OBSERVATIONS.

This profit satisfies me fully; if my future crops of clover pay as well, I have a strong idea that few parts of farming will answer better. I find by enquiry, that this field has not been particularly favoured in respect of manuring. It was a very regular crop.

The reader cannot but remark how trifling the expences are on this husbandry, the same tillage that served for the barley in 1762, prepared for the clover, so that there is not so much as an harrowing to be charged to it. Rent is almost the whole of a farmer's clover expences; and what adds greatly to this account is the ameliorating nature of the vegetable, which prepares the land excellently for wheat: this field is now sown with it, and

I find



I find it univerſally allowed by the farmers of this neighbourhood, that a good clean crop of clover is equal, and many times ſuperior, to a fallow in preparing for that grain. So that, in fact, the preparation for barley ſerves for three crops.

### EXPERIMENT N<sup>o</sup> 2.

Culture, expences, and produce, of two acres, field P, 1763.

#### CULTURE.

Sown with barley in Spring, 1762, and chiefly applied to the feeding hogs. This is a part of huſbandry with which I was very much unacquainted even in theory; but having a parcel of quarter and half grown hogs, called *shots* in this country, my bailey informed me, that I muſt appropriate a part of my clover for ſummer feeding them. Under the article *hogs* this application of clover will be more particularly conſidered; at preſent I ſhall only remark, that theſe two acres were herded out at a corner of the field, which was choſen becauſe there was a pond, which is abſolutely neceſſary. They were gate hurdles, and fixed down very carefully, and with much ſtrength. May 12th, a ſow, and ſeven large pigs a quarter grown, and eight hogs half grown, called *shots*, were turned in, and the gate locked upon them. The clover was about nine inches high, a thick and fine crop. About a week after, as I was walking by the field, I found one of the hogs had almoſt got through the hedge; I ordered the place to be immediately ſtrengthened, and this was the only time any of them were near getting out of the field. The middle of Auguſt I found the hogs would not keep the clover under, I therefore turned in four year old heifers and four horſes. All the cattle were taken out the laſt week of September.

#### EXPENCES.

	£.	s.	d.
1½ peck of feed,	0	9	4
Sowing,	0	0	6
Rent	1	14	0
	2	3	10

#### PRODUCE.

	£.	s.	d.
Keeping a ſow 20 weeks, at 3d.	0	5	0
Ditto 7 hogs, at 2½d.	1	9	2
Ditto 8 ditt, at 3d.	2	0	0
Ditto 4 heifers, at 1s. 6 weeks	1	4	0

Carried over                      4 18

Chap. I.	C L O V E R.			
Brought over,	-	-	4	18 2
Ditto 4 horses, at 15. 6d.	-	-	1	16 0
				<hr/>
			6	14 2
Expences,	-	-	2	3 10
				<hr/>
Profit 2l. 5s. 2d. per acre	-	-	4	10 4

#### OBSERVATIONS.

Not having hogs enough to feed off the clover entirely, without the Assistance of other cattle, I was forced to turn in some horses and heifers; but from the most attentive observation I could make on the feeding of these various sorts of cattle, I am pretty certain it would, at the above prices, have been more profitable to have fed it off entirely with hogs. The crop is, however, very profitable, the expences are very low, and the trouble of the management consists in nothing but taking good care of the fences.

#### EXPERIMENT N<sup>o</sup> 3.

Culture, expences, and produce, of two acres, field P. 1763.

##### CULTURE.

Sown with barley in Spring, 1762. Mown for hay the end of June; product dry in the Winter, 3 tons. Mown again for feed the 3d of October; produce 6 bushels.

##### EXPENCES.

	£.	s.	d.
1½ peck of feed,	0	9	4
Sowing,	0	0	6
Mowing, making, and carting hay,	0	5	0
Mowing, making, &c. for feed,	0	4	6
Threshing,	1	4	0
			<hr/>
	2	3	4
Rent, &c.	1	14	0
			<hr/>
	3	17	4

##### PRODUCE.

	£.	s.	d.
3 tons of hay at 30s.	4	10	0
6 bushels of feed,	9	5	0
			<hr/>
	13	15	0
Expences,	3	17	4
			<hr/>
Profit,	9	17	8
.Carting,	0	2	5
			<hr/>
Clear profit 4l. 17s. 7½d. per acre,	9	15	3

## OBSERVATIONS.

The profit of this crop is very great ; but then I should remark, that its being so high is owing, in a good measure, to the feed bearing an high price, being sold at a lucky time, as the market varied. But as all crops have the same advantage at different times, the amount is certainly to be charged to the account of the clover. I know not of any crop which, according to my little experience in husbandry, would have paid near so well for so small a disbursement of expence. And when it is considered that this profit arises from a preparation for a most valuable one, viz. wheat, the great consequence of it must at once be indubitable. I am so perfectly convinced of this fact that, accidents barred, I shall take care always to have a field or two of it. No grass gives a greater plenty of feed ; and consequently maintains more cattle—and I apprehend that the keeping great flocks of cattle, is the first end of farming in this age as well as in Cato's. The profit by them is considerable ; and the quantity of manure arising secures great products of every thing.

EXPERIMENT N<sup>o</sup> 4.

Culture, expences, and produce, of three acres, field P, 1763.

## CULTURE.

Sown with barley in Spring 1762. Fed it off with various sorts of cattle, from the middle of May to the 20th of October.

## EXPENCES.

	£.	s.	d.
Seed, - - - - -	0	12	6
Sowing, - - - - -	0	0	9
	0	13	3
Rent, &c. - - - - -	2	11	0
	3	4	3

## PRODUCE.

	£.	s.	d.
Keeping 4 cows 7 weeks, at 2s. - - - - -	2	16	0
Ditto 6 horses 7 weeks, at 1s. 6d. - - - - -	3	3	0
Ditto 25 sheep and 24 lambs 7 weeks, at 2 <sup>1</sup> d. a couple, - - - - -	1	15	0
Ditto 10 sheep 6 weeks, at 3d. - - - - -	0	5	0
	8	9	0
Expences, - - - - -	3	4	3
Profit 1l. 14s. 11d. per acre, - - - - -	5	4	9

OBSERVA-

## OBSERVATIONS.

This profit is considerable upon a crop so beneficial otherwise, as clover. The expences are so remarkably low that almost any produce would be profit. The rent of the land is the only article that figures in the account.

## Observations on the culture of Clover in 1763.

My experiments this year on clover have been upon the whole very successful : whether the farmers in general equal this profit depends on their soil ; for there has been nothing in any part of the management more than common. Now if any person will take the trouble to consider the great expences on crops of corn, and proportion them to the general produce, they will, I doubt not, conclude that the immediate profit of clover, according to the preceding trials, will be found far superior ;—and if the nature of the plants is taken into the account—the one impoverishing the soil and filling it with weeds ; the other destroying weeds and increasing fertility ; there would not be the least doubt of the vast excellency of this vegetable. The application of the crop is seen in these trials in several variations : my bailey, who is an uncommon advocate for clover, advised me to try it every way this year, and I am very glad he gave the advice, as I have thereby gained more experience in one year than I should otherwise have been able to do in several : however, I would not have it understood that I offer the result of these trials as decisive accounts of the culture in general : I am sensible the experiments of one year, which may be particularly favorable, ought never to satisfy any accurate person—future experience must be combined with the present, and the average taken as the important determination.

	£	s.	d.
Profit <i>per</i> acre by making hay, - - -	2	3	4
Profit <i>per</i> acre by feeding with hogs, - - -	5	2	
Profit <i>per</i> acre by mowing the first crop for hay, and the second for feed, - - -	16	8	1
Profit <i>per</i> acre by feeding with cows, horses and sheep, - - -	1	14	11

Of these different applications the feed is much the most profitable—but on this I should remark, that the quantity of the produce is considerable—more than common—and the price high, both which circumstances uniting, could not fail of carrying the profit very high. A crop of feed is also very uncertain respecting weather ; bad weather, after it is cut, half destroys it, for these reasons, the variations in the produce by feed will, I doubt not, in a course of years be very great ; consequently the high profit of this year, on comparison with the other methods of using it, is not to be so greatly considered.

Making hay, though not equally hazardous with feed, yet must necessarily be more dependant on chance than feeding, consequently something should be allowed for this circumstance in considering a single year only.

A point in this table of profit that deserves much attention is the great advantage that results from feeding clover. In many parts feed would be no object; and hay in abundance; then the feeding off the clover would probably be much the most beneficial use that could be made of it; we find the profit by eating it with hogs to be very great.—The difficulty of finding summer food for that animal, where clover is not used must be very great, and render that application of it highly expedient. The profit of it by feeding with other cattle is also very considerable, and proves the universal use of it.

### EXPERIMENT N<sup>o</sup> 5.

Culture, expences, and produce, of 2 acres 3 roods, 1764.

#### CULTURE.

The signature of this field is not minuted, as it is not a part of my farm; I hired it for the clover year of a tenant. The soil is a fine dry light turnip mould, inclining to gravel. The seed was sown among barley in the spring of 1763. I fed it off with various sorts of cattle.

#### EXPENCES.

	£.	s.	d.
1½ peck feed, at 30s.	-	0	11 3
Sowing,	-	0	0 8
Rent, at 17s.	-	2	6 9
		<hr/>	<hr/>
		2	18 8

#### PRODUCE.

	£.	s.	d.
Keeping 5 horses 3 months, at 1s. 6d.	-	4	10 0
Ditto 38 sheep and lambs 1 month, at 2½d. per couple	-	0	16 0
Ditto 2 heifers 2 months, at 1s.	-	0	16 0
Ditto 10 hogs 3 months, at 2d.	-	1	0 0
		<hr/>	<hr/>
		7	2 0
Expences,	-	2	18 8
		<hr/>	<hr/>
Profit 1l. 11s. 6d. per acre,	-	4	3 4

#### OBSERVATIONS.

This is a very advantageous profit to make on a crop that is almost what one may call a certain one: it has no hazard—and no trouble; two circumstances alone sufficient to recommend any—but joined with profit, are decisive. The hogs were this year, as in the last, kept continually in the field, night and day: during the three months they never once saw home.

EXPERI-

EXPERIMENT N<sup>o</sup> 6.

Culture, expences, and produce, of a rood, 1764, field L\*.

## CULTURE.

Sown with barley in 1763. In October, after the barley was carried, spread on the young clover four loads of rotten farm yard dung; the following summer it was mown twice hay; and afterwards (before wheat sowing) fed off with sheep. The produce of hay weighed dry the succeeding winter one ton.

## EXPENCES.

	£.	s.	d.
Seed and sowing,	0	1	1
Manuring	0	1	6
Mowing, making, &c. twice	0	2	3
	0	4	10
Rent, &c.	0	4	3
	0	9	1

## PRODUCE.

	£.	s.	d.
1 ton of hay,	1	10	0
Keeping 20 sheep 10 days, at 3d.	0	7	6
	1	17	6
Expences,	0	9	1
Profit,	1	8	5

£. s. d.

Carting hay,	0	0	2½
Ditto manure,	0	1	9
	0	1	11½

Clear profit 5l. 5s. 9d. per acre.

1 6 5½

## OBSERVATIONS.

I was at the expence of herdling this rood for the ten days sheep feed, but have not charged that expence, it being a mere matter of fancy—the means of registering the real value of the crop, but added nothing to it. The use of experiments in small, appears to me to be the proportioning them to fields in large. Had I employed my bailey to walk through the after feed, and valued it, the experiment would so have been very fair and perfect:—but I thought the real feeding it would be the true way to gain the value with accuracy, and therefore submitted to the expence.

The

The profit of the crop is very great, and shews clearly what clover will do with good management: the wetness of the season agreed very much with the dunging, and made the clover grow at a surprizing rate, the bulk of the hay was immense in the field—but I have minuted the winter weight. A clear profit of *5l. 4s. 4d. per acre* on a preparatory crop for wheat is very great;—much greater, I believe, than one crop of wheat in ten gives—at least if my intelligence is true.

EXPERIMENT N<sup>o</sup> 7.

Culture, expences, and produce, of a rood, field G\*, 1764.

## CULTURE.

Sown with oats in spring, 1763. The following summer mowed it twice for hay. Produce dry in the winter 15 cwt.

## EXPENCES.

	£.	s.	d.
Seed and sowing,	0	1	1
Mowing making, &c. twice,	0	2	1
	0	3	2
Rent, &c.	0	4	3
	0	7	5

## PRODUCE.

	£.	s.	d.
15 cwt. of hay,	1	2	6
Expences,	0	7	5
Profit,	0	15	1
Carting the hay,	0	0	2½
Clear profit <i>2l. 19s. 5d. per acre,</i>	0	14	10½

## OBSERVATIONS.

This trial is a fresh proof of the vast profit of clover: in the little experience I have had in husbandry, I have seen no crops that promise fairer: it is surprizing this plant is not more used by farmers than it is;—but I find it maintains such great stocks of cattle, that not many of the small ones possess a sufficiency for converting it to the best advantage. One circumstance, however, I should remark, which is, that all the clover I have yet had, has been sown with the first crop of corn after the fallow; and from the common farmers sowing it frequently with a second crop—and sometimes with a third; I apprehend they do not, upon an average, equal the profit which I have experienced.

perienced. It must be very bad husbandry not to give so excellent a vegetable fair play ; and two crops of corn preceding it cannot be such, for the number of weeds in the land must by that time be very great ; and tho' clover, if it comes up pretty strongly, will overpower many, yet some will be stronger and get the better of it ; and the crop must suffer from so many robbers of its nourishment. However, this point is of too much consequence to be trusted to reasoning alone ; experiment ought certainly to be employed to decide the exact degree in which each method is advantageous.—Next year I shall make the trial on my soils.

#### Observations on the crops of 1764.

My clover has this year fully answered the expectations which the crops of 1763 raised. I have had scarcely any thing so profitable on my farm, and nothing that has yielded a considerable profit at a less expence.

	£.	s.	d.
Profit per acre by feeding with horses, sheep, heifers and hogs,	1	11	6
Profit per acre by mowing twice for hay and feeding :—manured,	5	4	4
Profit per acre by twice mowing for hay,	2	18	7

The very great profit by the manured crop must be attributed to the manure ; but then it is of consequence to know that certain applications of the produce will pay for particular treatment ; I wish I had had an opportunity this year of equally manuring several roods, and using the crop of each differently : such comparisons are of very great utility ; but I must refer it for the business of other years. It is thus that the field of experiment opens by degrees, until a chain of prospects is beheld, that terrifies a man whose resolution and purse do not powerfully co-operate.

The difference is considerable between the feeding off by various cattle, and the mowing for hay ; but the comparison is not accurate, as the crops were not in the same field ; but as the soil and treatment are very nearly the same, I take the difference to arise from the good price which hay has yielded ; which in mowing crops is a great point.

#### EXPERIMENT N<sup>o</sup> 8.

Culture, expences, and produce, of two acres. 1765.

##### CULTURE.

This field I hired for the clover year ; the soil is a fine, light, dry turnip land. It is part of a field of eight acres, and was herded off from the rest for the sake of trying it several ways. The clover was sown with barley the first crop, in spring of 1764. I fed it off totally with hogs.

##### EXPENCES.



EXPENCES.				£.	s.	d.
1 ½ peck feed, at 35s.	-	-	-	0	13	1½
Sowing,	-	-	-	0	0	6
				0	13	7½
Rent, &c.-	-	-	-	1	14	0
				2	7	7½
PRODUCE.				£.	s.	d.
Keeping 21 hogs 5 months, at 2d. ½	-	-	-	4	6	8
Expences,	-	-	-	2	7	7½
Profit, 19s. 6d. * per acre,	-	-	-	1	19	0½

## OBSERVATIONS.

The year 1765 was so extremely dry, that no grass fields whether natural or artificial, yielded any thing like a full crop; the drought was so great that all sorts of fields and crops, were affected by it. Under such a circumstance, no one could expect that my field of clover would be as profitable as in wetter years, which generally agree best with most sorts of grass; the profit of 19s. 6d. per acre is certainly not trifling, considering this peculiarity of the year. But though the quantity of the feed has not been considerable, yet I should remark, that the quality of it was very good, for the hogs seemed to thrive with every sprig: this is a circumstance which I have heard remarked upon dry years in general, with all sorts of cattle: though the quantity is small, yet the nourishment is remarkable, and I have observed this year, that my cows have given very rich milk, that yielded much cream, when in pastures that seemed quite bare.

EXPERIMENT N<sup>o</sup> 9.

Culture, expences, and produce, of two acres, 1765.

The same field as N<sup>o</sup> 8. It was herded from the rest, and mowed twice for hay; of which it yielded 3 tons 6 cwt.

EXPENCES.				£.	s.	d.
Sseed,	-	-	-	0	13	1½
Sowing,	-	-	-	0	0	6
Mowing, making, &c. twice,	-	-	-	0	11	9
Carried over,	-	-	-	1	5	4½
				Brought		

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Brought over,	-	-	-	-	1	5	4½
Rent, &c.	-	-	-	-	1	14	0
<hr/>							
					2	19	4½
<hr/>							
PRODUCE.					£.	s.	d.
Three tons, 6 Cwt. of hay, at 45s.	-	-	-		7	8	6
Expences,	-	-	-		2	19	4½
<hr/>							
Profit,	-	-	-		4	9	1½
Carting the hay,	-	-	-		0	3	6
<hr/>							
Clear profit 2l. 2s. 9d. per acre,	-	-	-		4	5	7½

## OBSERVATIONS.

This profit is very considerable in any year, much more in one so remarkably dry as this: the crop much exceeded the expectations both of myself and bailey, but I am convinced, that in such dry years a given bulk of grafs weighs much heavier than in wet ones: the crop is nevertheless so considerable that I could scarcely suppose it merely owing to this circumstance: the drought, I apprehend, could not damage mowing crops so much as feeding ones, and for a very obvious reason:—the sun could not possibly scorch the surface of the earth that was covered with a crop, so much as that which was kept almost bare by cattle. The shade of a crop must moisten the earth, and the leaves and stalks retain the dew in proportion to their thickness. Every inch of growth, in a mowing crop, adds to the shade, and proportionably moistens the surface; but the case is very different with a fed one, that is kept constantly cropped.

Besides these circumstances, the drought raised the price of hay so greatly, that this crop was in value much superior to what it would have been in any other year, which raises the profit vastly; and is a circumstance that does not operate on feeding; for the profit by keeping or fattening cattle does not rise and fall like the price of hay. These particulars, I think, pretty well explain the reason of making the clover into hay, paying so much better than feeding it.

## EXPERIMENT N<sup>o</sup> 10.

Culture, expences, and produce, of three acres, 1765.

### CULTURE.

The same field as the preceding. It was fed throughout the Summer with several sorts of cattle.

EXPENCES.							£.	s.	d.
Seed,	-	-	-	-	-	-	0	19	8½
Sowing,	-	-	-	-	-	-	0	0	9
							1	0	5½
Rent, &c.	-	-	-	-	-	-	2	11	0
							3	11	5½
PRODUCE.							£.	s.	d.
Keeping 40 sheep and lambs 3 months at 2½d. per couple,							2	10	0
Ditto 4 cows 1 month, at 1s. 6d.							1	4	0
Ditto 9 horses 6 weeks, at 1s. 6d.							4	2	0
							7	16	0
Expences,	-	-	-	-	-	-	3	11	5½
Profit 1h. 8s. 2½d. per acre,	-	-	-	-	-	-	4	4	6½

## OBSERVATIONS.

The dryness of the season considered, this crop is by no means a poor one: 28s. an acre clear profit, upon so small a disbursement, will not be exceeded, upon an average, by many crops. The cattle being confined to three acres was a disadvantage; for I am told that it is a general opinion, and consistent indeed with reason, that the larger the range the better the cattle thrive; so that one piece of ten acres of grass will fatten or keep more cattle than two of five. The dividing this field was nothing relative to the clover itself; I did it merely for the sake of comparing the different applications of the produce.

EXPERIMENT N<sup>o</sup> II.

Culture, expences, and produce of one acre, 1765.

## CULTURE.

The same field. It was mown for hay first, and then for seed: of the first, it produced 16 cwt. and of the second 3½ bushels..

EXPENCES.							£.	s.	d.
Seed,	-	-	-	-	-	-	0	6	6½
Sowing,	-	-	-	-	-	-	0	0	3
Mowing and making twice,	-	-	-	-	-	-	0	8	6
Threshing,	-	-	-	-	-	-	0	14	9
Carried over,	-	-	-	-	-	-	1	10	0½
							Brought		

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Brought over	-	-	-	-	-	-	-	1 10 0½
Rent, &c.	-	-	-	-	-	-	-	0 17 0
								<hr/>
								2 7 0½
								<hr/>
PRODUCE.								£. s. d.
16 Cwt. of hay, at 45s.	-	-	-	-	-	-	-	1 16 0
3½ bushels seed, at 18s. 6d.	-	-	-	-	-	-	-	3 4 9
								<hr/>
								5 0 9
Expences,	-	-	-	-	-	-	-	2 7 0½
								<hr/>
Profit,	-	-	-	-	-	-	-	2 3 8½
Carting the clover twice,	-	-	-	-	-	-	-	0 1 8
								<hr/>
Clear profit,	-	-	-	-	-	-	-	2 2 0½

#### OBSERVATIONS.

I know not how clover feed varies in other parts of England, but here it is the strangest commodity you can deal in : very often the finest seed sells for a trifle ; at other times the worst is at a very high rate. This month clover feed is dear ; next it shall be very cheap. It is not a commodity of general growth, consequently is pretty much at the command of the jobbers in the feed, and we are so near the grand market for the feed, Norwich, that we feel this strongly. This crop was very good feed, and yet the price is very low. It is requisite to minute all such variations, because in drawing the average of the trials they are reduced to a medium, which is absolutely necessary with such objects.

But low as the price, yet the crop is, upon the whole, very advantageous. A clear profit of two guineas an acre, on an ameliorating vegetable, is very considerable. The farmers in this neighbourhood assert, that feeding the clover is not prejudicial to the wheat, but that I cannot conceive to be possible——nor do I apprehend that feeding it would, in a whole course, be so profitable as other applications. Mowing twice for hay gives the thick shade through summer, and the fall of the leaf ; both which are great objects : and feeding is free from all chances of bad weather, which, in a course of years, lower the profit both of feed and hay.

#### EXPERIMENT N<sup>o</sup> 12.

Culture, expences and produce of an acre and half, in three divisions, field L\*, 1765.

## CULTURE.

This piece I marked for a trial of sowing clover on land that had yielded various crops. One of these half acres yielded wheat in 1762, barley in 1763, and barley again in 1764, among which the clover was sown; so that this was with the third crop of corn. Another, which I shall call N<sup>o</sup> 2. was fallowed in 1762, yielded barley in 1763, and barley in 1764, among which the clover was sown; this was with the second crop. N<sup>o</sup> 3. was fallowed in 1763, and cropped with barley in 1764, among which the clover was sown; this consequently was with the first crop. As the pieces were not prepared by these crops for the present experiment, I cannot tell whether all the preceding husbandry had been precisely similar, respecting the dates and number of plowings which each had received, but no manure had been spread on any of them, and the variations of tillage could not well be very great. The field having been ploughed in different directions, and variously cropped, was the circumstance that enabled me this year to form the trial without taking more than one field for it. The spring tillage of the barley crops, among which the clover was sown, was the same. The seed was from the same heap, and sown on the same day; and the three pieces were equally water-furrowed. I mowed them twice for hay, and the produce dry in the winter, and the value, were as follows.

N<sup>o</sup> I. Third crop, 9 cwt. at 18s.

N<sup>o</sup> II. Second crop, 17 cwt. at 35s.

N<sup>o</sup> III. First crop, 25 cwt. at 45s.

Account of N<sup>o</sup> I.

## EXPENCES.

	£.	s.	d.
Seed,	0	3	3
Sowing,	0	0	1½
Mowing and making twice,	0	3	3
	<hr/>		
	0	6	7½
Rent, &c.	0	8	6
	<hr/>		
	0	15	1½

## PRODUCE.

	£.	s.	d.
9 Cwt. of hay, at 18s.	0	8	1
	<hr/>		
Loss,	0	7	0½
Carting the hay,	0	0	10
	<hr/>		
Total loss, at 14s. 11d. per acre,	0	7	5½

Account

Account of N<sup>o</sup> II.

EXPENCES.						£.	s.	d.
Seed and fowing,	-	-	-	-	-	0	3	4½
Mowing and making twice,	-	-	-	-	-	0	4	0
						<hr/>		
Rent, &c.	-	-	-	-	-	0	7	4½
						0	8	6
						<hr/>		
						0	15	10½
PRODUCE.						£.	s.	d.
17 cwt. at 35s.	-	-	-	-	-	1	9	9
Expences,	-	-	-	-	-	0	15	10½
						<hr/>		
Profit,	-	-	-	-	-	0	13	11½
Carting,	-	-	-	-	-	0	0	10
						<hr/>		
Clear profit, 1l. 6s. 3d. per acre,	-	-	-	-	-	0	13	1½

Account of N<sup>o</sup> III.

EXPENCES.						£.	s.	d.
Seed and fowing,	-	-	-	-	-	0	3	4½
Mowing and making,	-	-	-	-	-	0	4	3
						<hr/>		
Rent, &c.	-	-	-	-	-	0	7	7½
						0	8	6
						<hr/>		
						0	16	1½
PRODUCE.						£.	s.	d.
25 Cwt. at 45s.	-	-	-	-	-	2	16	3
Expences,	-	-	-	-	-	0	16	1½
						<hr/>		
Profit,	-	-	-	-	-	2	0	1½
Carting,	-	-	-	-	-	0	0	10
						<hr/>		
Clear profit 3l. 18s. 7d. per acre,	-	-	-	-	-	1	19	3½
						<hr/>		
Loss by the third crop per acre,	-	-	-	-	-	0	14	11
Profit by the second,	-	-	-	-	-	1	6	3
						<hr/>		
Latter superior by	-	-	-	-	-	2	1	2
						<hr/>		
						Loss		

	£.	s.	d.
Loss by the third crop,	0	14	11
Profit by the first,	3	18	7
Latter superior by	4	13	6
Profit by the first,	3	18	7
By the second,	1	6	3
Former superior by	2	12	4

## OBSERVATIONS.

This comparison is perfectly decisive. I should have remarked that much of the feed failed in N<sup>o</sup> 1, it came up thinly and vast numbers of weeds with it, so that through the season it looked quite like the field of the fluggard: the burthen of hay was much greater than I expected; but then the quality of it is execrable, by no means so good as choice straw, so large a portion of it being weeds. It is favoured in the preceding account in the price. But the gaining any thing that could at all be reckoned a crop, is more than there was reason to expect, for I am confident that five years out of six, not ten spires of clover in one acre would be found, for a wet season would have given such power to the weeds as totally to eradicate the clover. The smallness of the loss, on this execrable management, is a striking proof of the great profit of the clover husbandry; for any other crop proportionably low, would have been attended with pounds of loss. A husbandry that is extremely cheap in the management, and at the same time admits of great crops, cannot fail, in the long run, of proving uncommonly profitable.

One pound six and three pence profit by the clover sown with a second crop is considerable, and much more than I think there was reason to expect. Two successive corn crops always foul the land to a great degree, so that the clover cannot be expected to be tolerably clean, unless the preceding management has been very masterly. The profit of this piece being so much I attribute to the extreme dryness of the season, which certainly kept abundance of weeds under, and many seeds of others from vegetating. In a wetter year, I have no conception that the crop would have been near so clean.

The profit of the crop sown with the first of corn, is extremely great, and a strong proof among others, how very advantageous this culture is.

But the comparison, which is the principal point in this experiment, is as clear as possible; the difference between the best method and the worst is immense; and that between the first and second crop very great. What inducement farmers can have to sow their clover to such disadvantages I know

know not, certainly no rational ones. It must be owing to an eagerness of gaining as much corn as possible, on which they place their chief dependence: indeed clover requires more money to buy cattle to consume the produce than most of them afford for it; but it is much worthy of their remark, that the difference even between the first and second crops is equal and even superior to the total product *per* acre of many whole fields of spring corn, two guineas and an half are not reckoned a poor crop of barley or oats that succeed wheat in this country; at least among all except the very best of our farmers. Thus they are so far from gaining by this second crop of corn, that they only receive the produce this year to pay it in loss the next, and instead of land in excellent order for wheat, that is the clover stubble, they have a corn one, with half a crop of clover sown in it. The year after the balance is yet greater against them; the year after that it grows worse, so that a regular account of each method, kept through several courses, would soon have a balance, in favour of him who sowed his clover with the first crop, equal to the value of the fee simple of the land. Too much care and attention to this point, cannot be given, by any who are concerned in land. I shall renew this trial in future years, and have no doubt but in wet seasons the difference will be yet more considerable.

EXPERIMENT N<sup>o</sup> 13.

Culture, expenses, and produce of a rood, field T. 1765.

## CULTURE.

Sown with the first crop of barley in spring, 1764. In October I spread on it three cart loads of a compost, consisting of equal parts of coal ashes, mortar rubbish, and virgin earth or turf—which had been twice mixed. The succeeding summer mowed it twice for hay, of which the produce dry in the winter was 14 cwt.

EXPENCES.						£.	s.	d.
Seed,	-	-	-	-	-	0	1	7½
Sowing,	-	-	-	-	-	0	0	0¼
Manuring, cost and labour,	-	-	-	-	-	0	0	1½
Mowing, and making twice,	-	-	-	-	-	0	1	10
						<hr/>		
						0	9	7½
Rent, &c.	-	-	-	-	-	0	4	3
						<hr/>		
						0	13	10½
						<hr/>		

PRODUCE.



	PRODUCE.	£.	s.	d.
14 cwt. of hay, at 45s.	- - - - -	1	11	6
Expences,	- - - - -	0	13	10½
		<hr/>		
		0	17	7½
Carting the manure,	- - - - -	0	5	6
Ditto the hay,	- - - - -	0	0	5
		<hr/>		
		0	5	11
		<hr/>		
Clear profit, 2l. 6s. 9d. per acre,	- - - - -	0	11	8½
		<hr/>		

## OBSERVATIONS.

This profit much exceeds my expectations. The dryness of the season has been such, that much manuring has been useless, and some on dry soils even hurtful. But I apprehend neither of these was the case here, for the crop is large, tho' certainly not equal to what might have been expected in a wetter year. However, the natural moisture of this land is such, that the driest years, upon the whole, suit it best for all crops.

## Observations on the crops of 1765.

This year has been so remarkable a drought, and succeeding 1764, which was very wet, and 1763 much more inclined to it than otherwise, has offered a curious opportunity of considering this branch of husbandry under variations that must necessarily have a strong effect. Clover has this year answered every expectation that could be formed of it. I have not, in many variations of culture, had bad success with any trial except the single crop sown with the third of corn. All my other experiments have been attended with a very considerable profit; and tho' the price of hay has been high, yet the dryness of the season much reduced the quantity—and had the same effect with the crops eaten—nor has the price of feed been high. But notwithstanding these and other circumstances, yet we find, from the experiments of this year, that few crops are more profitable than clover—and none raised at so small a hazard and expence. These conclusions were very strong in the former wet years; and we now find them the same in this very dry one.

EXPERIMENT N<sup>o</sup> 14.

Culture, expences, and produce, of a rood, field M\*, 1766.

## CULTURE.

Sown with barley (the first crop) in spring 1765. During that year it made scarce any appearance among the corn, so that I feared it had failed; but

but in Autumn I found the plants pretty regular. I mowed it twice, once for hay and once for feed. Of the first I had 10 cwt. of dry hay; of the second 3 pecks of feed; the quality of neither feed nor hay good.

EXPENCES.						£.	s.	d.
$\frac{1}{4}$ of a peck of feed, at 18s.	-	-	-	-	-	0	1	1 $\frac{1}{2}$
Sowing,	-	-	-	-	-	0	0	0 $\frac{1}{4}$
Mowing and making, &c. twice,	-	-	-	-	-	0	3	0
Threshing the feed,	-	-	-	-	-	0	3	9
						<hr/>		
Rent, &c.	-	-	-	-	-	0	7	11 $\frac{1}{2}$
						0	4	3
						<hr/>		
						0	12	2 $\frac{1}{4}$
PRODUCE.						£.	s.	d.
10 cwt. of hay at 25s.	-	-	-	-	-	0	12	6
3 pecks of feed at 25s.	-	-	-	-	-	0	18	9
						<hr/>		
						1	11	3
Expences,	-	-	-	-	-	0	12	2 $\frac{1}{4}$
						<hr/>		
Profit,	-	-	-	-	-	0	19	0 $\frac{1}{4}$
Carting,	-	-	-	-	-	0	0	5
						<hr/>		
Clear profit, 3l. 14s. 6d. per acre,	-	-	-	-	-	0	18	7 $\frac{1}{2}$

## OBSERVATIONS.

The quantity of this produce was very great, and had the quality been answerable the crop would have turned out profitable to an uncommon degree. The best feed sold at 35s. and good hay from 40s. to 50s. per ton; consequently, with better luck, this profit might easily have been double. However, no one, I apprehend, will think 3l. 9s. 7d. per acre any trifle, from land that received no manure, and from a crop raised at so small an expence. The price marked in the above account of mowing and making is very high; this was occasioned by the bad weather.

EXPERIMENT N<sup>o</sup> 15.

Culture, expences, and produce of a rood, field P, 1766.

## CULTURE.

Sown with barley in 1765, and mown twice for hay the year following, of which the produce amounted to 15 cwt.

EXPENCES.							£.	s.	d.
Seed,	-	-	-	-	-	-	0	1	1½
Sowing,	-	-	-	-	-	-	0	0	0½
Mowing, making, &c. twice,	-	-	-	-	-	-	0	3	2
							0	4	4½
Rent, &c.	-	-	-	-	-	-	0	4	3
							0	8	7½
PRODUCE.							£.	s.	d.
15 cwt. of hay, at 20s.	-	-	-	-	-	-	0	15	0
Expences,	-	-	-	-	-	-	0	8	7½
Profit,	-	-	-	-	-	-	0	6	4½
Carting,	-	-	-	-	-	-	0	0	5
Clear profit, 1l. 3s. 11d. per acre,	-	-	-	-	-	-	0	5	11½

## OBSERVATIONS.

The rains came so unfortunately for this crop, after mowing, that the value of it was reduced comparatively to nothing—and even the weight dry vastly diminished by being so washed. Hay that is good fells so well, that the price marked for this is rating it but little more than as straw: but notwithstanding these disadvantages, yet the profit, considering the smallness of the advances, is by no means trifling, and much superior to most of the common corn crops around this place.

## EXPERIMENT. N° 16.

Culture, expences, and produce, of a rood, field T, 1766.

This is the same rood as was registered last year in Experiment N° 13. It was continued under clover this year, and fed off with sheep.

EXPENCES.							£.	s.	d.
Rent, &c.	-	-	-	-	-	-	0	4	3
PRODUCE.							£.	s.	d.
Keeping 20 sheep 3 weeks, at 3d.	-	-	-	-	-	-	0	15	0
Keeping 10 ditto a fortnight, at 3d.	-	-	-	-	-	-	0	5	0
							1	0	0
Expences,	-	-	-	-	-	-	0	4	3
Profit 3l. 3s. per acre,	-	-	-	-	-	-	0	15	9

OBSERVA-

## OBSERVATIONS.

This method of managing clover I am confident will, whenever the land is tolerably clean, be uncommonly profitable. The expence is merely that of rent—consequently there is no risque if the crop is fed. I have heard it often asserted that clover, if kept longer than one year, is apt to die off and become choaked with natural grasses:—but I should remark, that this crop continued very clean, and scarcely any of it died, notwithstanding the extreme wetness of the season. But, for a proof of this, I am determined to keep this rood another year under clover, which will throw the case beyond a doubt. Now, I think, a farmer who has a fine clover stubble, that was sown with a first crop of corn, on land well fallowed and clean of weeds, acts very injudiciously to plough it up, for any grain whatever; to take this experiment for our guide, what crop of wheat can he expect that will pay him better than clearing three guineas an acre, without the expenditure of a shilling, or chance of any thing but rent? Not one crop of wheat in forty does any thing like it; and as to the state in which the soil is left, surely a clover stubble will be allowed to be much more proper for another crop than a wheat one. I am told it is a common custom, in some parts of England, to sow wheat upon a two and even a three years old clover stubble, and with great success; nor can I conceive, from viewing this land, that it is in worse order for that grain than a year old stubble. It is clean—free from grass—and the value of this year's crop proves sufficiently, that the plants are in full vigour, consequently their roots increasing in size; and it is the roots of the clover that are the manure for the wheat. The great superiority of this husbandry appears so clearly to me, that I have no doubt but I shall find, in future years, fresh instances that will demonstrate it. To consider it more particularly, at present, would be to anticipate my subject; as it is an enquiry that belongs to the division concerning *the courses of crops*.

EXPERIMENT N<sup>o</sup> 17.

Culture, expences, and produce of three roods, field L\*, 1766.

## CULTURE.

I marked these roods for the trial of sowing clover with corn differently prepared for, to try the same point as my trial of last year N<sup>o</sup> 12. One of these roods, which I shall distinguish by the title of N<sup>o</sup> 1. has yielded but one crop, being summer land barley, in 1765, among which the clover was sown. N<sup>o</sup> 2. yielded summer land wheat in 1764, and barley in 1765, with which the clover was sown. N<sup>o</sup> 3. was cropped with wheat in 1763, barley in 1764, and again in 1765, with which the clover was sown. The event of the trial was this.—They were mown twice for hay: N<sup>o</sup> 1. yield-

ed, at the two mowings, 14 cwt. of hay, value 34*s.* *per* ton. N<sup>o</sup> 2. produced 8 cwt. value 26*s.* *per* ton. N<sup>o</sup> 3. was nothing but weeds.

Account of N<sup>o</sup> I.

EXPENCES.							£.	s.	d.
Seed,	-	-	-	-	-	-	0	1	1½
Sowing,	-	-	-	-	-	-	0	0	0½
Mowing and making twice,	-	-	-	-	-	-	0	3	4
							0	4	6½
Rent, &c.	-	-	-	-	-	-	0	4	3
							0	8	9½
PRODUCE.							£.	s.	d.
14 cwt. at 34 <i>s.</i>	-	-	-	-	-	-	1	3	9½
Expences,	-	-	-	-	-	-	0	8	9½
Profit,	-	-	-	-	-	-	0	15	0½
Carting,	-	-	-	-	-	-	0	0	5
Clear profit, 2 <i>l.</i> 18 <i>s.</i> 5 <i>d.</i> <i>per</i> acre,	-	-	-	-	-	-	0	14	7½

Account of N<sup>o</sup> II.

EXPENCES.							£.	s.	d.
Seed and fowing,	-	-	-	-	-	-	0	1	2½
Mowing and making,	-	-	-	-	-	-	0	3	2
							0	4	4½
Rent, &c.	-	-	-	-	-	-	0	4	3
							0	8	7½
PRODUCE.							£.	s.	d.
8 cwt. at 26 <i>s.</i>	-	-	-	-	-	-	0	10	4½
Expences,	-	-	-	-	-	-	0	8	7½
							0	1	9½
Carting,	-	-	-	-	-	-	0	0	5
Clear profit, 5 <i>s.</i> 5 <i>d.</i> <i>per</i> acre,	-	-	-	-	-	-	0	1	4½

Profit

						£.	s.	d.
Profit <i>per</i> acre, by N <sup>o</sup> 1.	-	-	-	-	-	2	18	5
Ditto by N <sup>o</sup> 2.	-	-	-	-	-	0	5	5
Superiority of the former,	-	-	-	-	-	2	13	0

## OBSERVATIONS.

The account of N<sup>o</sup> 3. is difficult to state : it consists of the difference between no crop, but a disappointment (which in so many cases is beyond all calculation) and the profit made on the other crops. Clover, it must be supposed, is an object of importance to the farmer, or he would not sow it : he probably depends on it to supply deficient pastures, in keeping a great part of his stock either in summer by feeding, or in winter by the hay : in which cases it is easy to judge how wretched the management must be, not to secure a good crop at all events after the spring corn is off the land, how mortifying to see the surface covered with weeds instead of clover ! What shifts must all the cattle of the farm experience the following year, when the field is thrown by for an expensive summer fallow ! instead of being fallowed profitably by clover, and left in a better condition for wheat than any ploughing can effect. There can be no doubt of clover, properly managed, being equal to any summer fallow as a preparation for wheat ; but what an amazing difference between a costly preparation, with an additional year's rent on it, and one that pays its expences with a considerable profit ! Such a state is beyond all calculation. And this is the proper comparison to make between these methods, as the sowing clover with a third crop of corn, according to this experiment, occasions the necessity of fallowing the land through the year in which it was expected to be under clover.

As to the comparison between sowing with a first, or a second crop of corn, the contrast is very striking. A superiority of 2*l.* 11*s.* 4*d.* *per* acre is immense—more, indeed, than can be expected in all years ; but we may be certain from it, that in the seasons most favourable to slovenly husbandry, the difference will yet be immense. The only motive urged by the farmers who act thus injudiciously, is the profit of a second crop of corn. Their land is perhaps clean and in good heart, and they cannot refrain, from an eagerness to be repaid for making it so. But what after-crop of corn will repay them for a loss of above fifty shillings *per* acre in their clover ? Besides the loss in the succeeding wheat, which must necessarily be very great ; since that which is sown second crop clover cannot be expected to amount to any value. Good common farmers will not venture wheat on such clover.

It is, upon the whole, greatly to be regretted, that such unprofitable husbandry should ever be known. Nothing can be more advantageous than clover properly managed, in the way it is used by most of our good farmers ; but

but in this execrable method of sowing it with second and third crops of corn, it degenerates to an unprofitable culture; and tends strongly to fill the farm with weeds.

EXPERIMENT N<sup>o</sup> 18.

Culture, expences, and produce, of an acre, field R, 1766.

## CULTURE.

In 1764 this piece yielded turnips; in 1765, barley, among which this clover was sown. I fixed upon it for the comparison of the application of clover, and with that view herded it into aced pieces. The whole was manured in October, at the rate of 15 loads *per* acre of a compost, consisting of various proportions of farm yard dung, town manure, turf, ditch earth, &c. &c. This acre was twice mown; once given green to horses in the stable, and once for hay. The first cut maintained 6 horses a month, and the second yielded a ton of dry hay; after this it was fed by sheep, and maintained 10, a week.

## EXPENCES.

	£.	s.	d.
1½ peck of feed,	0	5	4½
Sowing,	0	0	3
Manure, at 20d. <i>per</i> load, being the account of that compost,	1	5	0
Mowing,	0	1	2
Mowing and making, &c.	0	2	6
<hr/>			
Rent, &c.	1	14	3½
	0	17	0
<hr/>			
	2	11	3½

## PRODUCE.

	£.	s.	d.
Keeping 6 horses a month, at 20d.	2	0	0
One ton of hay,	1	10	0
Keeping 10 sheep a week,	0	2	6
<hr/>			
Expences,	3	12	6
	2	11	3½
<hr/>			
Profit,			

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Brought over	-	-	-	-	-	-	1	1	2½
						£. s. d.			
Carting,	-	-	-	-	-	0	1	3	
Ditto, the manure,	-	-	-	-	-	0	4	8	
							0	5	11
Clear profit,	-	-	-	-	-	-	0	15	5½

#### OBSERVATIONS.

The wetness of the season was divided in its effect on this crop: it increased the quantity of the whole, and without damaging the first cutting, as it was eaten green; but it did no trifling mischief to the second—or the hay would have been of greater value. But, upon the whole, there is reason to be satisfied: the benefit of the manure is by no means exhausted; on the contrary, the succeeding wheat will undoubtedly be a great crop, and the following turnips, certainly will reap no slight advantage from it. It is evident from this experiment, that the application of clover to the feeding horses in the stable is extremely profitable, for few single cuttings pay better than this.

#### EXPERIMENT N<sup>o</sup> 19.

Culture, expences, and produce, of one acre, field R, 1766.

##### CULTURE.

Sown with the barley of 1765, and manured as the preceding experiment. Fed it off totally with hogs.

EXPENCES.						£. s. d.
Seed,	-	-	-	-	-	0 5 4½
Sowing,	-	-	-	-	-	0 0 3
Manuring,	-	-	-	-	-	1 5 0
						1 10 7½
Rent, &c.	-	-	-	-	-	0 17 0
						2 7 7½

PRODUCE.						£. s. d.
Keeping 10 hogs 21 weeks, at 3d.	-	-	-	-	-	2 12 6
Keeping 8 ditto at 2d.	-	-	-	-	-	1 8 0
Keeping 5 ditto at 2½d 2 months,	-	-	-	-	-	0 8 4
						4 8 10



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32 Brought over,	-	-	-	-	-	4 8 10
Expences,	-	-	-	-	-	2 7 7½
Profit,	-	-	-	-	-	2 1 2½
Carting manure,	-	-	-	-	-	0 4 8
Clear Profit,	-	-	-	-	-	1 16 6½

#### OBSERVATIONS.

This trial is a striking proof of the great advantage of feeding clover with hogs, but I should remark, that the full value of the practice does not appear, for there is an undoubted difference between the feeding a single acre and a whole field. The latter is far more beneficial, and would certainly maintain a larger proportion of cattle. But this profit of 36s. after paying for a rich manuring is very considerable, and equalled by few other branches of husbandry. The wetness of the season was favourable to this application of the clover, for it rendered the quantity (after a manuring) extremely great, and did not damage it like hay or feed. I should observe, that the hogs were kept totally in the clover, it being herded so as to take a part of a pond into the acre.

#### EXPERIMENT N<sup>o</sup> 20.

Culture, expences, and produce of one acre, field R, 1766.

##### CULTURE.

The same as the preceding, and manured equally. Mowed it twice for hay, produced 3 tons 5 Cwt. of dry hay.

EXPENCES.						£.	s.	d.
Seed and sowing,	-	-	-	-	-	0	5	7½
Manuring,	-	-	-	-	-	1	5	0
Mowing and making, &c. twice,	-	-	-	-	-	0	6	6
						1	17	1½
Rent, &c.	-	-	-	-	-	0	17	0
						2	14	1½
PRODUCE.						£.	s.	d.
2 tons hay, at 32s.	-	-	-	-	-	3	4	0
1 ton, 5 Cwt. ditto, at 25s.	-	-	-	-	-	1	11	3
Carried over,	-	-	-	-	-	4	15	3

## Chap. I.

# C L O V E R.

33

Brought over,	-	-	-	-	-	-	-	-
Expences,	-	-	-	-	-	-	-	-
Profit,	-	-	-	-	-	-	-	-
Carting manure,	-	-	-	-	-	£.	s.	d.
Ditto the hay	.	-	-	-	-	o	4	8
						o	I	8
Clear profit,	-	-	-	-	-	-	-	-

## OBSERVATIONS.

This hay, particularly the first crop, I had better luck with than many of my others. The crop is considerable, and the profit very great, considering the expence of the manure is paid. Every field of clover that I register convinces me more and more of the great importance of this grass; I have not, upon the whole, experience of any other commonly conducted husbandry that equals it.

## EXPERIMENT N<sup>o</sup> 21.

Culture, expences, and produce, of one acre, field R, 1766.

## CULTURE.

The same field, and manured in the same manner. Fed it off throughout the summer with several sorts of cattle.

## EXPENCES.

[illegible]

PRODUCE.

PRODUCE.				£.	s.	d.
Keeping 2 oxen and 3 cow kine, a fortnight, at 1s. 6d.	-	-	-	0	15	0
Ditto 50 sheep, 3 weeks, at 3d.	-	-	-	1	16	0
Ditto 6 horses, a fortnight, at 1s. 6d.	-	-	-	0	18	0
				<hr/>		
Expences,	-	-	-	3	9	0
	-	-	-	2	7	7
				<hr/>		
Profit,	-	-	-	1	1	4 <sup>1</sup>
Vol. II.				Brought		

Brought over,	-	-	-	-	-	-	1	1	4½
Carting manure,	-	-	-	-	-	-	0	4	8
Clear profit,	-	-	-	-	-	-	0	16	8½

## OBSERVATIONS.

This is a beneficial produce, though not equal to some of the preceding ; but any single crop that yields a clear profit, tho' small, after paying the expence of a manuring that lasts more years than one, is advantageous : and considering clover as a preparation for another valuable crop, particularly so. These cattle, and indeed all I have at any time fed on clover, throve very well, notwithstanding the wetness of the season.

EXPERIMENT N<sup>o</sup> 22.

Culture, expences, and produce, of half a rood, field L\*, 1766.

## CULTURE.

Sown with first crop barley, in the spring of 1765. In October, manured it with very rotten farm yard dung, three cart loads. The last week in December following gave it a second manuring with coal ashes, the quantity one load. The middle of March, 1766, manured it a third time with ten bushels of malt dust. April began with many very heavy showers, which lasted till the 7th, and served advantageously to wash in the manures. From thence to the 17th, fine warm weather, and the growth of the clover was very extraordinary ; the crop was most unusually high and quite matted in thickness. Mowed it for hay the 26th of May—the weather not being favourable, I had not a good time for making ; but the weight of this cutting dry the succeeding winter was 5 cwt. of hay. July 19th, mowed it again, a full crop, but the season of making was again unfavourable : the weight of this cutting was 4½ cwt. Mowed it for a third time the 26th of September, and had a very fine making ; the weight 4 cwt. After this cutting, the crop sprouted again with such luxuriance, that by the end of November it kept me 10 sheep 4 days. Proportions *per acre*, are

EXPENCES.						£.	s.	d.
Seed and sowing,	-	-	-	-	-	0	5	7½
First manuring,	-	-	-	-	-	0	5	2
Second ditto,	-	-	-	-	-	1	1	4
Third ditto,	-	-	-	-	-	1	3	0
Mowing, making, &c. thrice,	-	-	-	-	-	0	8	0
Carried over,						3	3	1½

# Chap. I.

# C L O V E R.

Brought over,	-	-	-	-	3	3	1 <sup>1</sup> <sub>2</sub>
Rent, &c.	-	-	-	-	0	17	0
					4	0	1 <sup>1</sup> <sub>2</sub>
PRODUCE.					£.	s.	d.
First cutting, 2 tons, at 28s.	-	-	-	-	2	16	0
Second ditto, 36 cwt. at 30s.	-	-	-	-	2	14	0
Third ditto, 32 cwt. 36s.	-	-	-	-	2	17	7
Keeping sheep,	-	-	-	-	0	1	5
					8	9	0
Expences,	-	-	-	-	4	0	1 <sup>1</sup> <sub>2</sub>
Profit,	-	-	-	-	4	8	10 <sup>1</sup> <sub>2</sub>
					£.	s.	d.
Carting first manure,	-	-	-	-	0	11	3
Ditto the second,	-	-	-	-	1	11	1
Ditto the third,	-	-	-	-	0	15	2 <sup>1</sup> <sub>4</sub>
Carting hay thrice,	-	-	-	-	0	2	6
					3	0	0 <sup>1</sup> <sub>4</sub>
Clear profit,	-	-	-	-	1	8	9 <sup>1</sup> <sub>4</sub>

## OBSERVATIONS.

This is one of the most extraordinary crops I have known in husbandry. For a year's clover to pay the total expence of three ample manurings, and yield a surplus of 1*l.* 8*s.* 9*d.* *per* acre, is beyond what most will equal that are cultivated by farmers. But the profit of this is much less than it would have been under different circumstances: I apprehend the product by feeding would have been more considerable, as the seasons of hay making turned out so unfavourably. Certainly the profit would have been very different had I been more lucky in the two first seasons, for good clover hay paid 40*s.* 45*s.* and 40*s.* a ton, instead of 28*s.* and 30*s.* The favourable weather for the last mowing did not make amends for the difference, because the value of the last crop, in any weather, does not equal that of the preceding.

This great profit is not that of an exhausting plant, which draws from the land nearly the total of the nourishment as soon as given; on the contrary, it is one that prepares in the most admirable manner for succeeding ones; equal in all cases, and in most superior, to a fallow; in this light, the amazing advantages of clover must clearly appear.

I will not venture positively to assert, that the most profitable culture of this grass is so expensive a one as that of the present experiment; but I think there

is no slight reason to conclude that the abatement, if any, would be very small; for, in the first place, the immediate balance of the first year's account, is by no means trifling. Eight and twenty shillings clear profit on an ameliorating crop is considerable; and secondly, the great degree of fertility which the succeeding ones probably for several years must enjoy, is an object of the first magnitude. If wheat was sown there could be no doubt of a vast produce; but the better husbandry would, I apprehend, be the leaving the clover some years longer on the ground; in which method the certainty of considerable crops would be undoubted, and those of wheat equally great.

EXPERIMENT N<sup>o</sup> 23.

Culture, expences, and produce of half a rood, field M \* 1766.

## CULTURE.

Sown with the first crop of barley in spring, 1765. Manured it in October, with two loads of a compost of equal parts of coal ashes, mortar rubbish, hog dung, horse dung, and cleanings of streets, all town manure and mixed. In February following manured it a second time with twelve bushels of foot. Nothing could be finer than the very luxuriant growth of this clover in the spring. The many heavy rains that fell, brought it forward with such vigour, that it was a full crop for hay the 30th of May, when it was mown. The season for making it was not very favourable. The weather continued so showery, that the plants sprung again with uncommon strength. A second crop was mown the 29th of July; it was got up pretty well, I was lucky enough to have it on the great cock the third of August, when an extreme heavy shower fell. Finding a very quick vegetation after this hay was off, I determined to mow it a third time, and had a full growth mown the 16th of October. The products of these mowings, weighed dry in the winter, were as follow.

The first  $4\frac{1}{2}$  cwt.

The second  $4\frac{1}{2}$  cwt.

The third  $4\frac{1}{2}$  cwt.

## EXPENCES.

	£.	s.	d.
Seed and sowing,	0	5	7 $\frac{1}{2}$
First manuring,	2	3	4
Second ditto.	2	12	0
Mowing, making, &c. thrice,	0	8	3
	5	9	2 $\frac{1}{2}$
Rent, &c.	0	17	0
	6	6	2 $\frac{1}{2}$

PRODUCE.						£.	s.	d.
1 ton 16 cwt. of hay, first mowing, at 30s.	-	-	-	-	-	2	14	0
1 ton 18 cwt. the second mowing, at 32s.	-	-	-	-	-	3	0	9
1 ton 18 cwt. the third mowing, at 26s.	-	-	-	-	-	2	9	3
						8	4	0
Expences,	-	-	-	-	-	6	6	2½
Profit,	-	-	-	-	-	1	17	9½
						£.	s.	d.
Carting the first manure,	-	-	-	-	-	3	0	6
Ditto the second,	-	-	-	-	-	0	6	11¼
Ditto the hay,	-	-	-	-	-	0	2	6
						3	9	11¼
The above profit,	-	-	-	-	-	1	17	9½
Loss,	-	-	-	-	-	1	12	1¼

## OBSERVATIONS.

This crop is a very great one, but the expences of the manure ran so high, that great as it was, yet is it insufficient to repay such an expenditure. But the wrong balance of such an account proves nothing against clover in general; nor have I the least doubt but next year's produce of this piece (for I shall not plough it up) will repay this loss, and leave a very considerable profit besides. Had the manure been raised at home, the account would have been very different—but those that are totally purchased swell the expences so much, that it must be an extraordinary produce fully to pay them. Eight pounds worth of hay from an acre, at under prices, on account of unfavourable weather, are a product that proves the loss to be owing merely to excessive expences.

## General observations on the clover of 1766.

My experiments on clover throughout this year, have strongly confirmed the sentiments I had before entertained of it. The season has been as remarkably wet as ever known, inasmuch that all corn crops have been much damaged by it, on every soil but the extreme light ones. The rains have been so incessant, that the profit by making hay of clover, as of natural grass, has been much diminished. But notwithstanding these circumstances, the culture has been uncommonly successful. I have had scarcely any crops but such as have yielded very considerable profit;—and several that have been so very advantageous as to exceed most of the branches of common husbandry.

I have this year, as well as the preceding, found clover uniformly profitable however applied. In hay it has yielded most amply; the feeding by  
swine

swine alone has continued as beneficial as ever; and the feeding with different sorts of cattle has answered to my wishes. Upon the whole, I have the greatest reason, from this year's trials, to determine that clover is one of the main pillars of our agriculture.

EXPERIMENT N<sup>o</sup> 24.

Culture, expences, and produce, of a rood, field T, 1767.

## CULTURE.

This is the same rood that was registered in N<sup>o</sup> 16, experiment of last year. In November spread on it three loads of rotten farm yard dung; the summer following, mowed the first crop for hay, which yielded  $7\frac{1}{2}$  cwt. dry; fed off the after growth, which maintained 20 sheep 3 weeks.

## EXPENCES.

	£.	s.	d.
Manuring, - - - - -	0	1	4 $\frac{3}{4}$
Mowing and making, - - - - -	0	0	9
	0	2	1 $\frac{3}{4}$
Rent, &c. - - - - -	0	4	3
	0	6	4 $\frac{3}{4}$

## PRODUCE.

	£.	s.	d.
$7\frac{1}{2}$ cwt. of hay, at 35s. - - - - -	0	13	1 $\frac{1}{2}$
Keeping 20 sheep 3 weeks, at 3d. - - - - -	0	15	0
	1	8	1 $\frac{1}{2}$
Expences, - - - - -	0	6	4 $\frac{3}{4}$
Profit, - - - - -	1	1	8 $\frac{1}{4}$
	£.	s.	d.
Carting manure, - - - - -	0	2	4
Ditto the hay, - - - - -	0	0	2 $\frac{1}{2}$
	0	2	6 $\frac{1}{2}$
Clear profit 3l. 16s. 9d. per acre, - - - - -	0	19	2 $\frac{1}{4}$

## OBSERVATIONS.

This profit proves clearly, if any thing can, that clover well managed will last three years in great perfection. This piece gave no signs of such decay as made me in the least suspect it answering my wishes. Were I to stay longer on the farm, I should continue it most certainly another year; and from the appearance

appearance of it at present I have not a doubt of success. There is a little common grass and some couch in it, but the quantity is trifling, not more than common in many farmers first crops. But without enquiring into the particulars of its state, one may, without the imputation of extravagance, pronounce it bad husbandry to plough up a lay which yields from three to four pounds *per* acre clear profit. This crop, at the conclusion of the preceding year, gave no signs of a manuring being requisite; but I thought the utility of the experiment really required it: for no farmer, that really understands his business, would ever regret a manuring (or fail of it) if it was the means of gaining him a year's profitable clover, so that had I not manured this piece, and the crop been unprofitable (which, however, I am convinced would not have been the case) then the trial would have been unsatisfactory, for the proper treatment to make it continue profitable would not have been given it.

Upon the whole, this trial proves very strongly, that the most profitable culture of clover that is sown with a first crop, and managed in an excellent manner, is to continue it three years, on the ground most certainly, perhaps four. The clear profit resulting from each year's crop being, in all probability, greater than that of any wheat the farmer can expect by ploughing it up; and in a whole course very much superior in the state of the clover land in one case, and the wheat stubble in the other.

#### EXPERIMENT N<sup>o</sup> 25.

Culture, expences, and produce, of three roods, field P, 1767.

##### CULTURE.

As I had tried in the two preceding years the effect of sowing clover with the first second, and third crops of corn; I resolved to continue the experiments in many variations until I was absolutely clear in the result; on this account I again marked three pieces. N<sup>o</sup> 1. was sown with clover in the spring of 1766 with barley, which succeeded barley in 1765, which succeeded wheat in 1764. No. 2. was sown at the same time upon the second crop of barley, and N<sup>o</sup> 3. upon the first after turnips. They were all mown for hay twice, and the result as follows.

N<sup>o</sup> I. Yielded at the two mowings 3 cwt. Value 18s. *per* ton.

N<sup>o</sup> II. Yielded 10 cwt. value 27s.

N<sup>o</sup> III. Yielded 14 cwt. value 35s.

Proportions per Acre as follow:



Account of N<sup>o</sup> I.

EXPENCES.					£.	s.	d.
Seed,	-	-	-	-	0	4	0
Sowing,	-	-	-	-	0	0	3
Mowing and making twice,	-	-	-	-	0	5	3
					0	9	6
Rent, &c.	-	-	-	-	0	17	0
					1	6	6
PRODUCE.					£.	s.	d.
12 cwt. of hay, at 18s.	-	-	-	-	0	10	9½
Lofs,	-	-	-	-	0	15	8½
Carting the hay,	-	-	-	-	0	1	8
Total lofs,	-	-	-	-	0	17	4½

Account of N<sup>o</sup> II.

EXPENCES.					£.	s.	d.
Seed,	-	-	-	-	0	4	0
Sowing,	-	-	-	-	0	0	3
Mowing, making, &c. twice,	-	-	-	-	0	6	6
					0	10	9
Rent, &c.	-	-	-	-	0	17	0
					1	7	9
PRODUCE.					£.	s.	d.
40 cwt. of hay at 27s. per ton	-	-	-	-	2	14	0
Expences,	-	-	-	-	1	7	9
Profit,	-	-	-	-	1	6	3
Carting the hay,	-	-	-	-	0	1	8
Clear profit,	-	-	-	-	1	4	7½

Account

Account of N<sup>o</sup> III.

EXPENCES.						£.	s.	d.
Seed,	-	-	-	-	-	0	4	0
Sowing,	-	-	-	-	-	0	0	3
Mowing and making, &c. twice,	-	-	-	-	-	0	7	0
						0	11	3
Rent, &c.	-	-	-	-	-	0	17	0
						1	8	3
PRODUCE.						£.	s.	d.
Two tons 16 cwt. of hay at 35s.	-	-	-	-	-	4	18	0
Expences,	-	-	-	-	-	1	8	3
Profit,	-	-	-	-	-	3	9	9
Carting the hay,	-	-	-	-	-	0	1	8
Clear profit,	-	-	-	-	-	3	8	1
Loss by N <sup>o</sup> 1,	-	-	-	-	-	0	17	4½
Profit by N <sup>o</sup> 2,	-	-	-	-	-	1	4	7
Superiority of the latter,	-	-	-	-	-	2	1	11½
						£.	s.	d.
Loss by No 1,	-	-	-	-	-	0	17	4½
Profit by N <sup>o</sup> 3,	-	-	-	-	-	3	8	1
Superiority of the latter,	-	-	-	-	-	4	5	5½
Profit by N <sup>o</sup> 3,	-	-	-	-	-	3	8	1
Ditto by N <sup>o</sup> 2,	-	-	-	-	-	1	4	7
Superiority of the former,	-	-	-	-	-	2	3	6

## OBSERVATIONS.

N<sup>o</sup> 1. of this comparison turned out a better crop than I expected from its appearance after the corn was off, and also in the spring, when I should have ploughed it up had I continued in the farm; but some plants and many weeds vegetating during the latter part of the spring, and summer,

formed the crop. The other rood was the common sort of bad farmer's management; a pretty regular crop of clover, but much mixed with weeds, and not vigorous in its growth. Wet as the year in general was, yet I was lucky in the season of making the first cut of all three into hay, but not equally so with the second.

The comparison of the three methods of treating this grass, is very decisive; the difference of the profit is exceeding great; that between the first and second of corn, viz. 2*l.* 3*s.* 6*d.* equals considerable crops of corn in this neighbourhood: for the reader should consider, that when I speak at any time of *profit*; the idea is extremely different from any language used by farmers, of *fine* and *good crops*, &c. &c. I always mean *clear* of all expences. Now the husbandman who sacrifices a certain *clear* profit of 2*l.* 3*s.* 6*d.* per acre in clover, and without hazard, in expectation of re-payment in corn, plays as deep, and at the same time as imprudent a game as any man can do. Very little corn, I will venture to aver, in this neighbourhood, yields so great a profit as that sum: besides this, we are to consider the great difference the land is left in by clover and corn, which throws a very considerable sum to the balance in favour of the former.

Upon the whole, one cannot dwell too much on the necessity of every farmer who has these modes of treatment at option, reflecting well before he sows a second crop of corn, among which he purposes to throw in his clover. If he has no money to buy stock to eat it green, or in hay, nor any market for the hay, then we are not to wonder at the otherwise unaccountable conduct of so many common husbandmen, who seem to act diametrically contrary to their interest.

#### EXPERIMENT N<sup>o</sup> 26.

Culture, expences, and produce of half a rood, field L\*, 1767.

##### CULTURE.

The reader is desired to turn to experiment N<sup>o</sup> 22. of last year, that half rood of clover, compleatly managed, was continued this year. I mowed it twice for hay, of which it yielded at the two mowings, 7. cwt. and an half, of a very good quality; after which it was fed off with 20 sheep, and maintained them two days.—Proportions per acre.

EXPENCES.					£.	s.	d.
Mowing, and making twice,	-	-	-	-	0	5	9
Rent, &c.	-	-	-	-	0	17	0
					<hr/>		
					1	4	9
					<hr/>		
					PRODUCE.		

PRODUCE.						£.	s.	d.
Three tons of hay at 36s.	-	-	-	-	-	5	8	0
Keeping 20 sheep a fortnight at 3d.	-	-	-	-	-	0	10	0
						<hr/>		
Expences,	-	-	-	-	-	5	18	0
						<hr/>		
Profit,	-	-	-	-	-	4	13	3
Carting the hay,	-	-	-	-	-	0	1	8
						<hr/>		
Clear profit,	-	-	-	-	-	4	11	
						<hr/>		

## OBSERVATIONS.

This trial deserves no slight attention from those who practice an imperfect clover husbandry. It is here very evident, that too much expence can hardly in common husbandry be bestowed on this. This is the second year of the duration of this crop; last year it yielded a produce of above eight pounds an acre, which considerably more than paid all expences of culture and three ample manurings; any one may judge from the vast product of this year, what the profit next season would be, if left under clover: it is too great now not to be at least very considerable. If comparisons were accurately drawn up, of the perfect and common culture of clover on all sorts of soils, I have not the least doubt, but that even common farmers would, as far as they understood the case, decide in favour of the former. There cannot be a doubt of the reality of the superiority; wherever I move to from this farm, I shall prosecute these enquiries concerning the properties under many variations of this excellent crop: that I shall find it one of the most profitable in husbandry, I have not the least doubt.

EXPERIMENT N<sup>o</sup> 27.

Culture, expences, and produce, of half a rood, field T, 1767.

## CULTURE.

This piece in 1766, yielded barley in complete management both of tillage and manure. Just as the corn was coming up the clover seed was sown over it, and rolled in. I mowed it thrice for hay this year; the product of the three mowings 12 cwt. proportions *per* acre.

EXPENCES.							£.	s.	d.
Seed,	-	-	-	-	-	-	0	4	0
Sowing,	-	-	-	-	-	-	0	0	3
Mowing and making &c. thrice,	-	-	-	-	-	-	0	8	9
							0	13	0
Rent, &c.	-	-	-	-	-	-	0	17	0
							1	10	0
PRODUCE.							£.	s.	d.
Four tons, 16 cwt. of hay, at 35s.	-	-	-	-	-	-	8	8	0
Expences,	-	-	-	-	-	-	1	10	0
Profit,	-	-	-	-	-	-	6	18	0
Carting the hay thrice,	-	-	-	-	-	-	0	2	6
Clear profit,	-	-	-	-	-	-	6	15	6

## OBSERVATIONS.

When a farmer cultivates a field in a very masterly manner, the account of the first year or two is not to be regarded. When land is manured twice or thrice for one crop the balance of the account may probably be loss, and that not inconsiderable; but a Norfolk farmer who marles at the expence of five pounds an acre, to last twenty years, might as well look to the first crop for a reimbursement as myself to one of these in very complete management: this of clover shews what may be expected from succeeding ones. Above six pounds profit the first year succeeding that of the manuring is so considerable, that it is sufficient to pay almost any expence in reason, for the amount proves very clearly, that in following years there will be a very great profit, declining probably in a gradual manner: no one can suppose that a profit of 6*l.* 15*s.* will in the next year drop to a trifle; but, on the contrary, continue very considerable for several years. This shews strongly the great advantage of improving land to an high degree of fertility. Relative to the clover alone the profit is very noble, and is a proof, among many others, of its great excellency when well managed. I know not what others have experienced, but I have no reason, from mine, to prefer any other crop to it.

EXPERIMENT N<sup>o</sup> 28.

Culture, expences, and produce, of three acres and a half, field X, 1767.

## CULTURE.

Sown in the spring of 1766 with oats and pease, which were second crops. The whole amounted to 9½ acres, but I divided them into portions, for comparing

paring divers applications of the food. These acres were fed through the summer with hogs alone.

EXPENCES.						£.	s.	d.
Seed,	-	-	-	-	-	0	14	0
Sowing,	-	-	-	-	-	0	0	10½
						<hr/>		
Rent, &c.	-	-	-	-	-	0	14	10½
						2	19	6
						<hr/>		
						3	14	4½
						<hr/>		
PRODUCE.						£.	s.	d.
Keeping 20 hogs 10 weeks, at 3d.	-	-	-	-	-	2	10	0
Keeping 20 ditto 6 weeks, at 2½d.	-	-	-	-	-	1	5	0
Keeping 8 ditto 8 weeks, at 2d.	-	-	-	-	-	0	10	8
Keeping 10 ditto 10 weeks, at 1½d.	-	-	-	-	-	0	12	6
Keeping 16 ditto 6 weeks, at 1½d.	-	-	-	-	-	0	12	0
						<hr/>		
						5	10	2
Expences,	-	-	-	-	-	3	14	4½
						<hr/>		
Profit, 10s. 2½d. per acre,	-	-	-	-	-	1	15	9½

## OBSERVATIONS.

For clover this profit is small ; but then it should be considered, that it was sown with a second crop : and I should also add, that the field is in very poor heart, not having received any manuring for several years, and having been very indifferently farmed. Now let a vegetable be ever so excellent, yet bad husbandry will undoubtedly reduce the profit of it ; and in many instances to nothing. Had the field been sown with a crop of corn instead of this clover, the loss would have amounted to some pounds *per acre*. The hogs were kept totally to the clover, shut into the field.

EXPERIMENT N<sup>o</sup> 29.

Culture, expences, and produce, of two acres, field X, 1767.

## CULTURE.

The same field as the preceding trial. Mowed it twice for hay, of which it yielded, at the two mowings, 46 cwt. of dry hay.

EXPENCES.						£.	s.	d.
Seed,	-	-	-	-	-	0	8	0
Sowing,	-	-	-	-	-	0	0	6
						<hr/>		
Carried over,	-	-	-	-	-	0	8	6
						<hr/>		
						Brought		

Brought over	-	-	-	-	0	8	6
Mowing, making, &c. twice,	-	-	-	-	0	12	3
					1	0	9
Rent, &c.	-	-	-	-	1	14	0
					2	14	9
PRODUCE.					£.	s.	d.
46 cwt. of hay, at 30s.	-	-	-	-	3	9	0
Expences,	-	-	-	-	2	14	9
Profit,	-	-	-	-	0	14	3
Carting the hay,	-	-	-	-	0	3	4
Clear profit 5s. 4½d. per acre,	-	-	-	-	0	10	9

## OBSERVATIONS.

This profit, as well as the preceding, is very flight; but for the reasons before given one cannot wonder at it. However, the feeding it with hogs answered somewhat best, notwithstanding my having pretty good luck in the making; and all mowing crops being much more hazardous than fed ones. The hay was of a better quality than common, with poor crops of clover.

EXPERIMENT N<sup>o</sup> 30.

Culture, expences, and produce, of two acres, field X, 1767.

## CULTURE.

The same field as the preceding; but fed off with various cattle.

EXPENCES.					£.	s.	d.
Seed,	-	-	-	-	0	8	0
Sowing,	-	-	-	-	0	0	6
					0	8	6
Rent, &c.	-	-	-	-	1	14	0
					2	2	6
PRODUCE.					£.	s.	d.
Keeping 6 horses 3 weeks, at 1s. 6d.	-	-	-	-	1	7	0
Ditto 2 oxen and 3 cow kine, a fortnight, at 1s. 6d.	-	-	-	-	0	15	0
Ditto 60 sheep a week, at 3d.	-	-	-	-	0	15	0
Ditto 2 cows a fortnight, at 1s. 6d.	-	-	-	-	0	6	0
					3	3	0

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Brought over,	-	3	3	0
Expences,	-	2	2	6
Profit 10s. 3d. per acre,	-	1	0	6

### OBSERVATIONS.

When a field is badly managed, no application of its produce will render it profitable. Ten shillings an acre is considerable for this field to yield clear by the third crop; but it is inconsiderable for clover—which I have found, by many experiments, will not bear so slovenly a treatment.

### EXPERIMENT N<sup>o</sup> 31.

Culture, expences, and produce of 2 acres, field X. 1767.

#### CULTURE.

The same management as the preceding; but fed off the first crop with sheep, and mowed the second for feed; of which it produced  $3\frac{1}{2}$  bushels of a bad quality.

EXPENCES.		£.	s.	d.
Seed,	-	0	8	0
Sowing,	-	0	0	6
Mowing, making, &c.	-	0	8	9
Threshing,	-	1	1	0
		1	18	3
Rent, &c.	-	1	14	0
		3	12	3

PRODUCE.		£.	s.	d.
Keeping 50 sheep 3 weeks, at 3d.	-	1	16	0
$3\frac{1}{2}$ bushels feed, at 10s.	-	1	15	0
		3	11	0
Expences,	-	3	12	3
Produce,	-	3	11	0
Loss,	-	0	1	3
Carting,	-	0	1	8
Total loss, 1s. 5½d. per acre,	-	0	2	11

### OBSERVATIONS.



## OBSERVATIONS.

The whole conduct of this crop of feed turned out so unfavourably, with respect to weather, that I was almost induced by its threatening appearance, united with the number of weeds mown with it, to throw the crop aside as straw, and not worth threshing; the profit by it of 4s. a bushel is not equal to the risque and trouble. This trial is a fresh proof, that profitable as clover undoubtedly is, when managed properly, yet nothing is to be expected from it when sown in poor land, out of heart; but full of weeds; and it should accordingly be a lesson to others, as it will be to me, never to venture it under such circumstances. The comparison of these applications will be clearly seen in the following sketch.

	£.	s.	d.
Profit <i>per</i> acre by feeding with hogs, - - -	0	10	2½
Ditto mown twice for hay, - - -	0	5	4½
Ditto fed with various cattle, - - -	0	10	3
Loss; the first crop fed; the second mown for feed, -	0	1	5½

EXPERIMENT N<sup>o</sup> 32.

Expences and produce, of 7 acres, field P. 1767.

Sown among the barley of 1766, mown for hay June 27th; but rain falling, it was the 16th of July before it was got into the stack. Mown for feed October 17th, carried the 28th. Produce, 7 tons of hay the first mowing, and 7 bushels of feed the second.

	EXPENCES.	£.	s.	d.
1 bushel of clover seed, - - -	-	1	15	0
Sowing, - - -	-	0	1	9
Harrowing, - - -	-	0	1	0
Mowing, - - -	-	0	7	0
Making into hay, &c. - - -	-	0	14	0
Mowing, - - -	-	0	10	6
Harvesting, - - -	-	0	13	6
Threshing, at 6s. - - -	-	2	2	0
		<hr/>		
Rent, &c. - - -	-	6	4	9
		5	19	0
		<hr/>		
		12	3	9
		<hr/>		

PRODUCE.

	PRODUCE.	£.	s.	d.
7 tons of hay sold for	-	9	0	0
7 bushels of feed ditto	-	3	10	0
		<hr/>		
Expences,	-	12	10	0
		<hr/>		
Profit 10½d. per acre,	-	0	6	3
		<hr/>		
Harrowing at 4½d.	-	0	2	7½
Carting hay at 10d.	-	0	5	10
Ditto, second cut,	-	0	5	10
		<hr/>		
The above,	-	0	14	3½
Profit,	-	0	6	3
		<hr/>		
Loss,	-	0	8	0½
		<hr/>		

## OBSERVATIONS.

It is in the first place to be remarked, that both the cuts of this clover met with very ill luck, the first in being damaged by rain, so as to render 7 tons worth no more than 9*l.* whereas they would have produced, if good, at least 14*l.* The excessive wetness of the season, which continued after the first cutting brought on the second crop so rank, that there was evidently too much of it for a good crop of feed, which seldom is had in a large quantity of straw; and made it so late before the stalks had done growing, that the feed had no time to form itself, nor fun to ripen the little that did form: some farmers in the same situation mowed their crops for hay, and it would have been but prudent had I done the same, the quantity of hay would have been full a ton and an half *per* acre, and would have been worth, even in bad weather to make it in, much more than the feed; for if we reckon it only at 2*s.* the 30 cwt. it would have produced 8*l.* 15*s.* at the same expence of mowing and making the feed had, and without that of threshing, which would alone have added 7*l.* 7*s.* to the above profit or 1*l.* 1*s.* per acre: so material is the difference between managing a crop in one way or in another. The failure of this experiment proves nothing against the vast profit attending clover, since there was enough in this field to have turned out extremely advantageous, with a small variation of conducting it.

EXPERIMENT N<sup>o</sup> 33.

Expences, and produce of four acres, field Q, 1767.

Sown among the barley of 1766 ; mown for hay the 29th of June ; prevented by rain from getting it up before the 17th of July ; mown for feed October 18th ; carried it the 28th. Produce 4 ton 10 cwt. hay, of the first mowing, and  $3\frac{1}{2}$  bushels of feed the second.

EXPENCES.						£.	s.	d.
Seed,	-	-	-	-	-	1	0	0
Sowing,	-	-	-	-	-	0	1	0
Harrowing,	-	-	-	-	-	0	0	9
Mowing,	-	-	-	-	-	0	4	0
Making,	-	-	-	-	-	0	9	2
Mowing,	-	-	-	-	-	0	6	0
Harvesting,	-	-	-	-	-	0	9	0
Threshing, at 6s.	-	-	-	-	-	1	1	0
						<hr/>		
Rent, &c.	-	-	-	-	-	3	10	11
						3	8	0
						<hr/>		
						6	18	11
PRODUCE.						£.	s.	d.
4 tons 10 cwt. hay, sold for	-	-	-	-	-	6	0	0
$3\frac{1}{2}$ bushels of feed,	-	-	-	-	-	1	15	0
						<hr/>		
						7	15	0
Expences,	-	-	-	-	-	6	18	11
						<hr/>		
Profit, 4s. per acre,	-	-	-	-	-	0	16	1
						£.	s.	d.
Harrowing, at $4\frac{1}{2}d.$	-	-	-	-	-	0	1	6
Carting hay, at 10d.	-	-	-	-	-	0	3	4
Ditto second cut,	-	-	-	-	-	0	3	4
						<hr/>		
						0	8	2
						<hr/>		
Clear profit, 1s. 11 $\frac{1}{4}d.$ per acre,	-	-	-	-	-	0	7	11

## OBSERVATIONS.

As this crop received the same culture, was applied to the same use, and met with the same unlucky season as the last registered, the same remarks are applicable to both.

EXPERI-

EXPERIMENT N<sup>o</sup> 34.

Expences, and produce, of 3 acres, field E\*, 1767.

Sown among the wheat of 1766, in March, fed till the end of June, and then shut up for feed; mown October 18th, and carried the 27th, produce 5 bushels.

EXPENCES.				£.	s.	d.
Seed,	-	-	-	0	15	0
Sowing,	-	-	-	0	1	3
Mowing,	-	-	-	0	4	6
Harvesting,	-	-	-	0	5	0
Threshing at 6s.	-	-	-	1	10	0
				2	16	3
Rent, &c.	-	-	-	2	11	0
				5	7	3
PRODUCE.				£.	s.	d.
Keeping 80 sheep, 2 weeks at 2½d.	-	-	-	1	13	4
7 horses, 3 weeks, at 1s. 6d.	-	-	-	1	11	6
3 ditto, 2 weeks, at 1s. 6d.	-	-	-	0	9	0
5 bushels of feed, at 13s.	-	-	-	3	5	0
				6	18	10
Expences,	-	-	-	5	7	3
Profit, 10s. 6d. per acre,	-	-	-	1	11	7
Carting at 10d.	-	-	-	0	2	6
				1	8	1
Clear profit, 9s. 4d. per acre,	-	-	-			

## OBSERVATIONS.

It is observable, that clover sown among wheat, as it admits not of any covering but what accidental showers give, seldom proves a regular plant, but this, owing to some heavy rains which fell after the sowing, came up very regularly. The mowing it was a most unusual thing, as it grew upon ridges, and consequently the tops of the stalks could alone be cut, which grew in the furrows; yet it turned out much much the best of the three crops of feed I had this year; which I attribute to its lying so dry on the ridges, and perhaps likewise, it threshed the better for so much of the useless part of the plants being left in the field; certain it is, the quality of the feed was much better than the rest, as appears by the price. Though it was

not a crop of consequence, yet it was profitable, and superior to what I received from fields that had been better cultivated, and of a better soil.

### General observations on the crops of 1767.

My clover this year, has not, upon the whole, equalled the profit of preceding seasons; but this failure I should remark, is clearly not owing to any ill property in the plant itself, or a want of capability of profit, but merely to several of the crops being treated in a very indifferent manner; of which there cannot be a stronger proof than the fields yielding crops to the full, as advantageous as ever, that were well conducted. These have been so extremely profitable, that I am convinced from them, that no common crop is more advantageous; without reckoning the circumstance of preparing for corn. And if the smallness of the expenditure and risque are taken into the account, none will be found that equal the well conducted of this year's trials.

Clover indeed appears, from the variety of experiments, I have this year made on it, to be so very advantageous a culture, that I have no conception of any farmers on extensive arable farms, conducting their business to great profit without it. When there is not a great plenty of natural grass on a farm, how they can do without artificial, I know not; and it is very well known that clover will thrive on many soils totally improper for sainfoine.

### GENERAL OBSERVATIONS on these EXPERIMENTS.

My trials on clover have been so various, that no clear idea can be formed of them without drawing the result into tables, that averages of each particular may be calculated. The experience of any single year is by no means such satisfactory evidence as the medium of several. I shall, in the first places lay before the reader the general view of all the trials, under the heads of Expences, Product, and Profit and Loss.

EXPENCES.						s.	d.
Expence per acre, N <sup>o</sup> 1. experiment,	-	-	-	-	-	1 12	1½
N <sup>o</sup> 2.	-	-	-	-	-	1 1	11
3.	-	-	-	-	-	1 19	10½
4.	-	-	-	-	-	1 1	5
5.	-	-	-	-	-	1 1	4
6.	-	-	-	-	-	2 4	3
7.	-	-	-	-	-	1 10	7
8.	-	-	-	-	-	1 3	9½
9.	-	-	-	-	-	1 11	4½
10.	-	-	-	-	-	1 3	9½
						N <sup>o</sup> 11.	

							£.	s.	d.
N <sup>o</sup> 11.	-	-	-	-	-	-	2	8	8½
12.	(1)	-	-	-	-	-	1	11	1
	(2)	-	-	-	-	-	1	13	5
	(3)	-	-	-	-	-	1	13	11
13.	-	-	-	-	-	-	3	19	2
14.	-	-	-	-	-	-	2	10	5
15.	-	-	-	-	-	-	1	16	1
16.	-	-	-	-	-	-	0	17	0
17.	(1)	-	-	-	-	-	1	16	9
	(2)	-	-	-	-	-	1	16	1
18.	-	-	-	-	-	-	2	17	2½
19.	-	-	-	-	-	-	2	12	3½
20.	-	-	-	-	-	-	3	0	5½
21.	-	-	-	-	-	-	2	12	3½
22.	-	-	-	-	-	-	7	0	2½
23.	-	-	-	-	-	-	9	16	1½
24.	-	-	-	-	-	-	1	15	9
25.	(1)	-	-	-	-	-	1	8	2
	(2)	-	-	-	-	-	1	9	5
	(3)	-	-	-	-	-	1	9	11
26.	-	-	-	-	-	-	1	6	5
27.	-	-	-	-	-	-	1	12	6
28.	-	-	-	-	-	-	1	1	3
29.	-	-	-	-	-	-	1	9	0½
30.	-	-	-	-	-	-	1	1	3
31.	-	-	-	-	-	-	1	16	11½
32.	-	-	-	-	-	-	1	16	10½
33.	-	-	-	-	-	-	1	16	9½
34.	-	-	-	-	-	-	1	16	7
							£	82	12 8½

Average, £2. 2s. 4½d.

Experiment, N <sup>o</sup>							£.	s.	d.
1.	-	-	-	-	-	-	3	15	0
2.	-	-	-	-	-	-	3	7	1
3.	-	-	-	-	-	-	6	17	6
4.	-	-	-	-	-	-	2	16	4
5.	-	-	-	-	-	-	2	12	0
6.	-	-	-	-	-	-	7	10	0
							N <sup>o</sup> 7		

## ARTIFICIAL GRASSES.

Book V.

					£.	s.	d.
N <sup>o</sup> 7.	-	-	-	-	4	10	0
8.	-	-	-	-	2	3	4
9.	-	-	-	-	3	14	3
10.	-	-	-	-	2	12	0
11.	-	-	-	-	5	0	9
12.	-	(1)	-	-	0	16	2
		(2)	-	-	2	19	6
		(3)	-	-	5	12	6
13.	-	-	-	-	6	6	0
14.	-	-	-	-	5	5	0
15.	-	-	-	-	3	0	0
16.	-	-	-	-	4	0	0
17.	(1)	-	-	-	4	15	2
	(2)	-	-	-	2	1	6
18.	-	-	-	-	3	12	6
19.	-	-	-	-	4	8	10
20.	-	-	-	-	4	15	3
21.	-	-	-	-	3	9	0
22.	-	-	-	-	8	9	0
23.	-	-	-	-	8	4	0
24.	-	-	-	-	5	12	6
25.	(1)	-	-	-	0	15	8½
	(2)	-	-	-	2	14	0
	(3)	-	-	-	4	18	0
26.	-	-	-	-	5	18	0
27.	-	-	-	-	8	8	0
28.	-	-	-	-	1	11	5½
29.	-	-	-	-	1	14	6
30.	-	-	-	-	1	11	6
31.	-	-	-	-	1	15	6
32.	-	-	-	-	1	15	7
33.	-	-	-	-	1	18	9
34.	-	-	-	-	3	6	3½

£ 154 12 5½

Average, £3. 19s. 3d.

Profit

PROFIT and LOSS.					£.	s.	d.
Experiment, N <sup>o</sup> 1. Profit,	-	-	-	-	2	2	10½
2.	-	-	-	-	2	5	2
3.	-	-	-	-	4	17	7
4.	-	-	-	-	1	14	11
5.	-	-	-	-	1	11	6
6.	-	-	-	-	5	5	9
7.	-	-	-	-	2	19	5
8.	-	-	-	-	0	19	6½
9.	-	-	-	-	2	2	9½
10.	-	-	-	-	1	8	2½
11.	-	-	-	-	2	2	0½
12.	(2)	-	-	-	1	6	3
	(3)	-	-	-	3	18	7
13.	-	-	-	-	2	6	9
14.	-	-	-	-	3	14	6
15.	-	-	-	-	1	3	11
16.	-	-	-	-	3	3	0
17.	(1)	-	-	-	2	18	5
	(2)	-	-	-	0	5	5
18.	-	-	-	-	0	15	3½
19.	-	-	-	-	1	16	6½
20.	-	-	-	-	1	14	9½
21.	-	-	-	-	0	16	8½
22.	-	-	-	-	1	8	9½
24.	-	-	-	-	3	16	9
25.	(2)	-	-	-	1	4	7
	(3)	-	-	-	3	8	1
26.	-	-	-	-	4	11	7
27.	-	-	-	-	6	15	6
28.	-	-	-	-	0	10	2½
29.	-	-	-	-	0	5	4½
30.	-	-	-	-	0	10	3
33.	-	-	-	-	0	1	11½
34.	-	-	-	-	0	9	4½
					£ 74 12 2½		
N <sup>o</sup> 12. Loss,	-	-	-	-	0	14	11
23.	-	-	-	-	1	12	1½
25.	(1)	-	-	-	0	17	4½
					3 4 5½		
					Brought		



				£.	s.	d.
Brought over,	—	—	—	3	4	5½
Nº 31.	—	—	—	0	1	5½
32.	—	—	—	0	8	0½
				<hr/>		
				3	13	11½
Clear profit,	—	—	—	<hr/>		
				£	70	18 3½
<hr/>						
Average, £1. 18s. 3d.						

				£.	s.	d.
Average expence <i>per</i> acre,	—	—	—	2	2	4
Ditto product,	—	—	—	3	19	3
Ditto profit,	—	—	—	1	18	3

Upon this general review of all the preceding experiments, the ill conducted and slovenly ones, as well as those that were managed in a proper and complete manner, it is to be remarked, that the expence is not high: the account includes some trials very richly manured, at a great expence. The product is very considerable; it should be well attended to by those husbandmen who fix their eye on corn alone as the only object of a farm that deserves regard. Four pounds *per* acre are a very considerable average crop for the course of five years on various soils, and under numerous very different circumstances. Even in the wheat crops in this neighbourhood, except on the grounds of our best farmers, I am well persuaded the average crop does not amount to four pounds, and yet they exert the chief of their attention to wheat, as the principal object on a farm. Those who are best acquainted with the husbandry of our cold, wet, flat, woodcock loams will not contradict this opinion. Is it not therefore somewhat extraordinary, that a fallow crop, which is thrown in to ease the land—to clean and ameliorate it—and prepare for wheat and other corn crops;—is it not extraordinary, that such an one should turn out so very valuable, as even to equal, if not exceed, those of wheat itself? There is no comparison between my wheat and my clover crops in general; I have found a far greater profit on the latter than on the former.

This vegetable is allowed, by all farmers who have had experience of it, to prepare for corn in many instances equally, and in some superior to a fallow. In this respect, therefore, the value of clover is very great; but it prepares for all crops in another method:—by maintaining large stocks of cattle, and consequently raising large quantities of dung. To instance two fields of twenty acres each, one summer fallowed for wheat, and the other under clover for wheat: what a prodigious difference between the accounts at the end of the fallow year! The fallow field has, on the wrong side of the account not only a year's rent, but a long train of tillage expences,—whereas the clover with

with only a very slight expence, yields a produce of three or four pounds *per* acre, and prepares equally well for the corn; the difference between such *profit* in one case, and such *expence* in the other, is prodigious. The clear profit of clover, viz. *1l. 18s. 3d. per* acre, is very great; and when gained from a crop so very beneficial in all other circumstances, becomes uncommonly so.

Upon the whole, the prejudice, ignorance, or inattention of those farmers who yet continue so blindly in the old route of husbandry, as not to cultivate this incomparable grass, is much to be regretted. It behoves all gentlemen who live in such parts of the kingdom as have not yet received this branch of cultivation, to use their utmost endeavours to extend the practice, since the acquisition of it must indubitably be extraordinarily great. Where pastures and meadows are scarce, and sainfoine not in use, I can hardly conceive how the farmers can do without it.

Respecting the division of these experiments, according to the circumstances, I shall first lay before the reader the two variations of soil, *clayey* and *gravelly* loams, leaving out those which were manured.

## C L A Y.

EXPENCES.				£.	s.	d.
Experiment, N <sup>o</sup> 12.	(1)	-	-	1	11	1
	(2)	-	-	1	13	5
	(3)	-	-	1	13	11
17.	(1)	-	-	1	16	9
	(2)	-	-	1	16	1
28.	-	-	-	1	1	3
29.	-	-	-	1	9	0½
31.	-	-	-	1	16	11½
33.	-	-	-	1	16	9½
34.	-	-	-	1	16	7
				16	11	10½

Average *1l. 13s. 2¼d.*

PRODUCE.				£.	s.	d.
Experiment, N <sup>o</sup> 12.	(1)	-	-	0	16	2
	(2)	-	-	2	19	6
	(3)	-	-	5	12	6
17.	(1)	-	-	4	15	2
	(2)	-	-	2	1	6

Experiment, N <sup>o</sup>				£.	s.	d.
28.	-	-	-	1	11	5½
29.	-	-	-	1	14	6
31.	-	-	-	1	15	6
33.	-	-	-	1	18	9
34.	-	-	-	3	6	3½
				26	11	3½

Average, £2. 13s. 1¼d.

PROFIT and LOSS.				£.	s.	d.
Profit, N <sup>o</sup> 12.	(2)	-	-	1	6	3
	(3)	-	-	3	18	7
17.	(1)	-	-	2	18	5
	(2)	-	-	0	5	5
28.	-	-	-	0	10	2½
29.	-	-	-	0	5	4½
33.	-	-	-	0	1	11½
34.	-	-	-	0	9	1¼
				9	15	7

N <sup>o</sup>	(1)	Loss,		£.	s.	d.
12.		-	-	0	14	11
13.		-	-	0	1	5½
				0	16	4½
				8	19	2½

Average, 17s. 11d.

### GRAVELLY.

Experiment, N <sup>o</sup>				£.	s.	d.
1.	-	-	-	1	12	1½
2.	-	-	-	1	1	11
3.	-	-	-	1	19	10½
4.	-	-	-	1	1	5
5.	-	-	-	1	1	4
7.	-	-	-	1	10	7
8.	-	-	-	1	3	9½
9.	-	-	-	1	11	4½
10.	-	-	-	1	3	9½
11.	-	-	-	2	8	8½
14.	-	-	-	2	10	5
				Experiment		

Experiment N<sup>o</sup> 15.

18.

19.

20.

21.

25.

(1)

(2)

(3)

32.

£.	s.	d.
1	16	1
2	17	2½
2	12	3½
3	0	5
2	12	3½
1	8	2
1	9	5
1	9	11
1	16	10½
<hr/>		
36	8	0½

Average, £1. 16s. 4½d.

PRODUCE.

Experiment N<sup>o</sup> 1.

2.

3.

4.

5.

7.

8.

9.

10.

11.

14.

15.

18.

19.

20.

21.

25.

(1)

(2)

(3)

32.

£.	s.	d.
3	15	0
3	7	1
6	17	6
2	16	4
2	12	0
4	10	0
2	3	4
3	14	3
2	12	0
5	0	9
5	5	0
3	0	0
3	12	6
4	8	10
4	15	3
3	9	0
0	15	8½
2	14	0
4	18	0
1	15	7
<hr/>		
72	1	3½

Average, £3. 12s.

PROFIT and LOSS.

Experiment N<sup>o</sup> 1. Profit,

2.

3.

£.	s.	d.
2	2	10½
2	5	2
4	17	7

H 2

Experiment



*in these years*, because they happen to be remarkable wet ones ; that is four out of the five ; and every one will, I apprehend, agree that the season, in the great variations of *dry* and *wet*, must have a very strong influence on the production of a grass in clayey and gravelly loams. In wet years there can be no doubt but the gravelly soil will have the advantage ; this is strongly proved by these experiments : I will not, however, venture to determine, that in dry years the contrary would be the case ; for, in the first place, I have not the rule of experiment to be my guide ; and, in the next, I have not, on my gravels, observed them to suffer much in the single dry year I have known, although it was a drought.

Dry soils, when they are not of too loose a nature, have numerous advantages. By dry land I mean, on this farm, those which are more inclinable to dryness than to moisture ; but they would not in dry countries go under that name. They are very sound lands, and excellently adapted to turnips and barley ; but they are, at the same time, strong enough for wheat ; which double quality is, I take, the greatest mark of excellent land, that will suit all sorts of crops. The clover ones on it I have remarked always to plough up in a loose crumbling state, that harrowed as fine as a garden : crops of wheat on it are scarcely ever bad when succeeding clover, agreeing better with that preparation than with a fallow. They admit ploughing in good order, when one cannot go upon the clayey loams at all.

Now it much behoves a farmer who has the command of both these soils, and chuses to have only a certain quantity of clover every year, to sow it always on the gravelly loams : this management is very easy in the arrangement of his crops, and will assuredly answer his expectations. We find the superiority of the gravel in this comparison, in clear profit, to amount to 17s. 7d. *per acre*, or, in other words, to more than the rent of the land. This is considerable, and demands the farmer's attention very strongly.

I shall, in the next place, extract the experiments that were in different years tried, to decide the point of sowing with a first, second, or third crop.

### S O W N with a F I R S T C R O P.

EXPENCES.						£.	s.	d.
Experiment N <sup>o</sup> 12.	-	(3)	-	-	-	1	13	11
17.	-	(1)	-	-	-	1	16	9
25.	-	(3)	-	-	-	1	9	11
						<hr/>		
						5	0	7
						<hr/>		

Average, £1. 13s. 6½d.

PRODUCE.

PRODUCE.				£.	s.	d.
Experiment N <sup>o</sup> 12.	-	(3)	-	5	12	6
17.	-	(1)	-	4	15	2
25.	-	(3)	-	4	18	0
				15	5	8

Average, £5. 1s. 10½d.

PROFIT and LOSS.				£.	s.	d.
Experiment N <sup>o</sup> 12.	-	(3)	Profit, -	3	18	7
17.	-	(1)	- -	2	18	5
25.	-	(3)	- -	3	8	1
				10.	5	1

Average, £3. 8s. 4¼d.

### SOWN with a SECOND CROP.

EXPENCES.				£.	s.	d.
Experiment N <sup>o</sup> 12.	-	(2)	-	1	13	5
17.	-	(2)	-	1	16	1
25.	-	(2)	-	1	9	5
				4	18	11

Average, £1. 12s. 11½d.

PRODUCE.				£.	s.	d.
Experiment N <sup>o</sup> 12.	(2)	-	-	2	19	6
17.	(2)	-	-	2	1	6
25.	(2)	-	-	2	14	0
				7	15	0

Average, £2. 11s. 8d.

PROFIT and LOSS.				£.	s.	d.
Experiment N <sup>o</sup> 12.	-	(2)	Profit, -	1	6	3
17.	-	(2)	- -	0	5	5
25.	-	(2)	- -	1	4	7
				2	16	3

Average, 18s. 9d.

Sown

## SOWN with a THIRD CROP.

EXPENCES.				£.	s.	d.
Experiment N <sup>o</sup> 12.	-	(1)	-	1	11	1
25.	-	(1)	-	1	8	2
Average, £1. 9s. 7½d.				2	19	3
PRODUCE.				£.	s.	d.
Experiment N <sup>o</sup> 12.	-	(1)	-	0	16	2
25.	-	(1)	-	0	15	8½
Average, 10s. 11¼d.				1	1	10¼
PROFIT and LOSS.				£.	s.	d.
Experiment N <sup>o</sup> 12.	-	(1)	Loss,	0	14	11
25.	-	(1)	-	0	17	4½
Average, 16s. 1¼d.				1	12	
				£.	s.	d.
Product by the first crop,	-	-	-	5	1	10¼
Ditto by the second,	-	-	-	2	11	8
Superiority of the former,	-	-	-	2	10	2¼
Product by first crop,	-	-	-	5	1	10¼
Ditto by the third,	-	-	-	0	10	11¼
Superiority of the former,	-	-	-	4	10	11
Product by second crop,	-	-	-	2	11	8
Ditto by third,	-	-	-	0	10	11¼
Superiority of the former,	-	-	-	2	0	8½
Profit by the first crop,	-	-	-	3	8	4¼
Ditto by the second,	-	-	-	0	18	9
Superiority of the former,	-	-	-	2	9	7½

Profit



	£.	s.	d.
Profit by first crop, - - - - -	3	8	4½
Loss by the third, - - - - -	0	16	1¼
Superiority of the former, - - - - -	4	4	6
Profit by second crop, - - - - -	0	18	9
Loss by the third, - - - - -	0	16	1¼
Superiority of the former, - - - - -	1	14	10¾

Nothing can be more decisive than this comparison; and if the account of all three of the third sowing was included, the contrast would be yet stronger; but the land being ploughed up, as it totally failed, the particulars could not be noticed, but the loss in *disappointment* is very great, and would, in many cases, be beyond calculation.

We find that the true clover husbandry is to sow it with the first crop of corn after the fallow or fallow crop; and the difference between such management, and sowing it with a second crop is so great (amounting to no less, on an average, than 2*l.* 9*s.* 7*d.* profit superiority) that it is difficult to conceive for what purpose a farmer can act so preposterously as to delay the sowing it. The second crop of corn, which can be his only inducement, upon our soils and with the general management of this country, can never recompence him for the loss of the clover. This will appear very clearly from a slight calculation.

At the end of the first year the accounts of both fields under barley are the same.

	£.	s.	d.
Suppose the clear profit on the first barley crop to be -	2	10	0
That on the clover sown with it is - - - - -	3	8	4½
Suppose that on the wheat succeeding this clover to be -	4	0	0
And the turnips succeeding the wheat to yield clear -	1	0	0
Total of this course, - - - - -	10	18	4½

	£.	s.	d.
With the other management the first barley crop is the same, -	2	10	0
After this comes a second, which cannot be estimated at more than -	1	5	0
That of the clover is - - - - -	0	18	9
The wheat will, I am confident, be in the same proportion as } the clover, which is - - - - -	1	3	0
Total of this course, - - - - -	5	16	9

Superiority

Superiority at the end of the fourth year,

£. s. d.  
5 1 7½

This is giving to each an equality of years, but the turnip crop being the least profitable, each should have one; the comparison must therefore be taken another year.

Total of first course,

£. s. d.  
10 18 4½

Profit on the following barley crop as before,

2 10 0

---

13 8 4½

Total of the second

5 16 9

Profit on the following turnips,<sup>a</sup>

0 17 0

---

6 13 9

Total of the first,

13 8 4½

Ditto of the second,

6 13 9

Superiority at the end of the fifth year,

---

6 14 7½

This comparison is sufficient to shew the vast superiority of sowing the clover with the first crop of corn. But it would in a few years increase in a much quicker proportion, for every crop that is unfavourably taken, robs the land, and leaves it in a so much worse state for all succeeding ones, until the soil gets, through mere bad management, into that state which is termed by farmers *unkindly*. It is then extremely hazardous, not one crop in three is profitable; the occupier is cheated of half his expences and trouble.—It is then that whole years of loss come to be deducted from the account, by crops totally failing. The reader may easily judge of the state of the comparison at the end of twenty years, supposing the degradation only in proportion to the above account of 6*l.* 14*s.* 7*d.* at the end of five years it amounts to 26*l.* 18*s.* 4*d.* in twenty, which is near 6*l.* more than the fee simple of the land at thirty years purchase, reckoned at 14*s.* *per* acre. Can any thing mark the consequence of good management more than such a superiority.

But some farmers who are good ones in the main, sow clover with second crops of corn, and yet get profitable ones, as well as of corn. But the loss of such is not far short of the others. If the comparison was made by these, the balance of it would turn out the same; the fields properly conducted

<sup>a</sup> One cannot allow the same to these turnips as to the others, for this plain reason, that the one field is *increasing* in fertility, the other decreasing.



Experiment, N <sup>o</sup> 24.	-	-	-	1	15	9
18.	-	-	-	2	17	2½
				10	16	4½

Average, £2. 14s. 1d.

PRODUCE.				£.	s.	d.
Experiment, N <sup>o</sup> 6.	-	-	-	7	10	0
12.	-	-	-	6	6	0
24.	-	-	-	5	12	6
18.	-	-	-	3	12	1
				23	1	0

Average, £5. 15s. 3d.

PROFIT and LOSS.				£.	s.	d.
Experiment, N <sup>o</sup> 6.	-	-	-	5	5	9
13.	-	-	-	2	6	9
24.	-	-	-	3	16	9
18.	-	-	-	0	15	3½
				12	4	6½

Average, £3. 1s. 1½d.

# AFTER COMPLETE MANURING.

EXPENCES.				£.	s.	d.
Experiment, N <sup>o</sup> 26.	-	-	-	1	6	5
27.	-	-	-	1	12	6
				2	18	11

Average, £1. 9s. 5½d.

PRODUCE.				£.	s.	d.
N <sup>o</sup> 26.	-	-	-	5	18	0
27.	-	-	-	8	8	0
				14	6	0

Average, £7. 3s.

PROFIT and LOSS.				£.	s.	d.
Experiment, N <sup>o</sup> 26.	-	-	-	4	11	7
27.	-	-	-	6	15	6
				11	7	1

Average, £15. 13s. 6½d.

I 2

After

## AFTER COMMON MANURING.

EXPENCES.				£.	s.	d.
Experiment, N <sup>o</sup> 16.	-	-	-	0	17	0
PRODUCE.				£.	s.	d.
Experiment, N <sup>o</sup> 16.	-	-	-	4	0	0
PROFIT.				£.	s.	d.
Experiment, N <sup>o</sup> 16.	-	-	-	3	3	0

## NOT MANURED.

EXPENCES.				£.	s.	d.
Experiment, N <sup>o</sup> 1.	-	-	-	1	12	1½
2.	-	-	-	1	1	11
3.	-	-	-	1	19	10½
4.	-	-	-	1	1	5
5.	-	-	-	1	1	4
7.	-	-	-	1	10	7
8.	-	-	-	1	3	9½
9.	-	-	-	1	11	4¼
10.	-	-	-	1	3	9¾
11.	-	-	-	2	8	8¾
12.	(3)	-	-	1	13	11
14.	-	-	-	2	10	5
15.	-	-	-	1	16	1
17.	(1)	-	-	1	16	9
19.	-	-	-	2	12	3½
20.	-	-	-	3	0	5½
21.	-	-	-	2	12	3½
25.	(3)	-	-	1	9	11
28.	-	-	-	1	1	3
29.	-	-	-	1	9	0½
30.	-	-	-	1	1	3
31.	-	-	-	1	16	11½
32.	-	-	-	1	16	10¼
33.	-	-	-	1	16	9½
34.	-	-	-	1	16	7
Average, £ 1. 14s. 7½d.				43	5	9½

PRO-

		PRODUCE.			£.	s.	d.
Experiment, No	1.	-	-	-	3	15	0
	2.	-	-	-	3	7	1
	3.	-	-	-	6	17	6
	4.	-	-	-	2	16	4
	5.	-	-	-	2	12	0
	7.	-	-	-	4	10	0
	8.	-	-	-	2	3	4
	9.	-	-	-	3	14	3
	10.	-	-	-	2	12	0
	11.	-	-	-	5	0	9
	12.	(3)	-	-	5	12	6
	14.	-	-	-	5	5	0
	15.	-	-	-	3	0	0
	17.	(1)	-	-	4	15	2
	19.	-	-	-	4	8	10
	20.	-	-	-	4	15	3
	21.	-	-	-	3	9	0
	25.	(3)	-	-	4	18	0
	28.	-	-	-	1	11	5½
	29.	-	-	-	1	14	6
	30.	-	-	-	1	11	6
	31.	-	-	-	1	15	6
	32.	-	-	-	1	15	7
	33.	-	-	-	1	18	9
	34.	-	-	-	3	6	3¼
Average, £3. 9s. 9d.					87	5	6½

		PROFIT and Loss.			£.	s.	d.
Experiment, No	1.	Profit	-	-	2	2	10½
	2.	-	-	-	2	5	2
	3.	-	-	-	4	17	7
	4.	-	-	-	1	14	11
	5.	-	-	-	1	11	6
	7.	-	-	-	2	19	5
	8.	-	-	-	0	19	6¼
	9.	-	-	-	2	2	9¾
	10.	-	-	-	1	8	2¼
	11.	-	-	-	2	2	0¼
	12.	(3)	-	-	3	18	7
	14.	-	-	-	3	14	6
					Experiment		

				£.	s.	d.
Experiment, N <sup>o</sup>	15.	-	-	1	3	11
	17.	(1)	-	2	18	5
	19.	-	-	1	16	6½
	20.	-	-	1	14	9½
	21	-	-	0	16	8½
	25.	(3)	-	3	8	1
	28.	-	-	0	10	2½
	29.	-	-	0	5	4½
	30.	-	-	0	10	3
	33.	-	-	0	1	11½
	34.	-	-	0	9	4½
				43	12	8½

				£.	s.	d.
N <sup>o</sup> 31. Loss,	-	-	-	0	1	5½
32.	-	-	-	0	8	0½
				0	9	6

Clear profit,	-	-	-	43	3	2½
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Average, £1. 14s. 6d.

COMPARISON.				£.	s.	d.
Expence <i>per</i> acre completely manured,	-	-	-	8	8	2
Ditto commonly manured,	-	-	-	2	14	1
Excess of the former,	-	-	-	5	14	1
Expence completely manured,	-	-	-	8	8	2
Ditto after complete manuring,	-	-	-	1	9	5½
Excess of the former,	-	-	-	6	18	8½
Expence completely manured,	-	-	-	8	8	2
Ditto after a common manuring,	-	-	-	0	17	0
Excess of the former,	-	-	-	7	11	2
Expence completely manured,	-	-	-	8	8	2
Expence not manured,	-	-	-	1	14	7½
Excess of the former,	-	-	-	6	13	6½
				Expence		

# CLOVER.

Product



	£.	s.	d.
Product <i>per</i> acre completely manured, - - -	8	6	6
Ditto not manured, - - -	3	9	9
Superiority of the former, - - -	4	16	9
Produce <i>per</i> acre after a complete manuring, - - -	7	3	0
Ditto <i>per</i> acre commonly manured, - - -	5	15	3
Superiority of the former, - - -	1	7	9
Product <i>per</i> acre after a complete manuring, - - -	7	3	0
Ditto after common manuring, - - -	4	0	0
Superiority of the former, - - -	3	3	0
Product <i>per</i> acre after completely manuring, - - -	7	3	0
Ditto not manured, - - -	3	9	9
Superiority of the former, - - -	3	13	3
Product <i>per</i> acre commonly manured, - - -	5	15	3
Ditto after common manuring, - - -	4	0	0
Superiority of the former, - - -	1	15	3
Product <i>per</i> acre commonly manured - - -	5	15	3
Ditto not manured, - - -	3	9	9
Superiority of the former, - - -	2	5	6
Product <i>per</i> acre after a common manuring, - - -	4	0	0
Ditto not manured, - - -	3	9	9
Superiority of the former, - - -	0	10	3
Profit <i>per</i> acre after a complete manuring - - -	5	13	6½
Ditto commonly manured, - - -	3	1	11½
Superiority of the former, - - -	2	12	5
Profit <i>per</i> acre after a complete manuring, - - -	5	13	6½
Ditto after common manuring, - - -	3	3	0
Superiority of the former, - - -	2	10	6½

Profit

	£.	s.	d.
Profit <i>per</i> acre after a complete manuring	5	13	6½
Ditto not manured	1	14	6
Superiority of the former	3	19	0½
Profit <i>per</i> acre after a complete manuring,	5	13	6½
Loss <i>per</i> acre completely manured	0	1	8
Superiority of the former,	5	15	2½
Profit <i>per</i> acre after a common manuring	3	3	0
Ditto commonly manured,	3	1	1½
Superiority of the former	0	1	10½
Profit <i>per</i> acre after common manuring,	3	3	0
Ditto not manured	1	14	6
Former superior by	1	8	6
Profit <i>per</i> acre after common manuring	3	3	0
Loss <i>per</i> acre completely manured.	0	1	8
Former superior by	3	4	8
Profit <i>per</i> acre commonly manured,	3	1	1½
Ditto not manured,	1	14	6
Former superior by	1	6	7½
Profit <i>per</i> acre commonly manured	3	1	1½
Loss <i>per</i> acre completely manured	0	1	8
Former superior by	2	19	5½
Profit <i>per</i> acre not manured,	1	14	6
Loss <i>per</i> acre completely manured	0	2	8
Former superior by	1	12	10

I have stated this comparison at full length, because it is a very important one ; It appears from it, that clover, on the average of the two experiments here inserted, is insufficient by 1s. 8d. *per* acre to repay the expence of complete manuring. But this insufficiency arises merely from the height of the expence ; for the average *product per* acre, is 8l. 6s. 6d. which is so

very ample, that it leaves not the least room for complaint. The expences paid, and only 1s. 6d. loss, with the land left so extremely rich, and ready for the production of vast corn crops; or continued clover ones, shew that in a course, the profit would be very great.

The crops which succeed complete management, are of all the others most profitable; amounting to 5*l.* 13*s.* 6½*d.* This is not wonderful; for the whole expence being charged to the crop manured, the clover in question follows it without any extraordinary expence, and it appears evidently from the produce (7*l.* 3*s.*) that the manure is in full vigour; so that the profit could not fail of being extremely high. This great benefit attending clover, in complete management, ought to induce all farmers to render their clover land as rich as possible, as it is sufficiently clear that nothing can repay it better, in the course of a few years.

The experiments commonly manured, come next in produce (5*l.* 15*s.* 3*d.*) but not in profit (3*l.* 1*s.* 1½*d.*) for those after the manuring, yield a higher, viz. 3*l.* 3*s.* This is owing to the expence of the manuring, being on one but not on the other: but it shews very strongly that the benefit of it lasts in very good heart longer than the first year.

In general, the great expediency of manuring clover is clearly seen in the products alone.

			£.	s.	d.
Produce <i>per</i> acre completely manured,	-	-	8	6	6
Ditto after a complete manuring,	-	-	7	3	0
Ditto commonly manured,	-	-	5	15	3
Ditto after a common manuring	-	-	4	0	0
Ditto not mauured;	-	-	3	9	9

The gradation of these products shew the importance of manures to clover; in perfection they have the power to more than double the produce of the crops that succeed a common manuring. Those which follow complete manuring, are more than doubly superior to others not manured at all. But what demands particular attention, is the produce of these crops, that follow complete management, (7*l.* 3*s.*) It amounts very near to that of the completely manured, (8*l.* 6*s.* 6*d.*) This circumstance shews, what is of very great importance; that a complete manuring is almost as good the second year as the first; from whence we cannot fail to conclude, that several succeeding years would also be in great heart. Now such a consideration proves that the loss of 1*s.* 6*d.* in the profit and loss account of the completely manured, should be looked on as a great profit; since the next years produce would be upwards of 7*l.* consequently the profit exceeding high:

high : and the year after that cannot be estimated to produce less than 5*l.* 10*s.* or 6*l.* so that the course of three or four clover years after a complete manuring, would probably prove more beneficial than manuring in less quantities.

I must be allowed farther to remark, that the produce of the crops which received a common manuring, viz. 5*l.* 15*s.* 3*d.* is very great, and ought by all means to induce every farmer who cultivates clover, to apply himself particularly to the improvement of it by manuring. I do not apprehend that a produce of 5*l.* 15*s.* 3*d.* from so small an expence as attends clover, would be gained by any other crop ; and the succeeding one amounting to 4*l.* without any expence but rent, is a circumstance enjoyed by no other crop. It would, after these crops, be extremely profitable for another year ; or if ploughed up for wheat, yield an undoubted benefit ; such advantages arising from one common manuring, I am confident. cannot be reaped by any other application of it.

The product of the crops not manured at all, viz. 3*l.* 9*s.* 9*d.* is very considerable, and being the average of many trials during the course of five years in different seasons, and under numerous applications, is particularly satisfactory ; the sum is considerable in itself, but when we reflect, that it is from an ameliorating crop, that cleans and prepares the land for wheat and other corn crops, the benefit of it becomes prodigious.

The next view to be taken of this most excellent vegetable, is, the application of its produce, for which purpose I shall extract the experiments that were perfectly similar in all other respects.

These variations are the following,

Made into hay,

Second crop seeded.

Fed with Hogs.

Fed with sundry Cattle.

H A Y.

EXPENCES.				£.	s.	d.
Experiment, N <sup>o</sup> 1.	-	-	-	1	12	1½
9.	-	-	-	1	11	4½
20.	-	-	-	3	0	5½
29.	-	-	-	1	9	0½
				7	12	11½

Average, £1. 18*s.* 2¼*d.*

K 2

PRODUCE.

PRODUCE.				£.	s.	d.
Experiment, N <sup>o</sup> 1.	-	-	-	3	15	0
9.	-	-	-	3	14	3
20.	-	-	-	4	15	3
29.	-	-	-	1	14	6
				13	19	0

Average, £. 3 13s.

PROFIT and LOSS.				£.	s.	d.
Experiment, N <sup>o</sup> 1. Profit,	-	-	-	2	2	10½
9.	-	-	-	2	2	9½
20.	-	-	-	1	14	9½
29.	-	-	-	0	5	4½
				6	5	10½

Average, £1. 11s. 5½d.

## SECOND CROP SEEDED.

EXPENCES.				£.	s.	d.
Experiment, N <sup>o</sup> 3.	-	-	-	1	19	10½
11.	-	-	-	2	8	8½
31.	-	-	-	1	16	11½
				6	5	6½

Average, £. 2. 1s 10¼d.

PRODUCE.				£.	s.	d.
Experiment, N <sup>o</sup> 3.	-	-	-	6	17	9
11.	-	-	-	5	0	9
31.	-	-	-	1	15	6
				13	13	9

Average, £4. 11s. 3d.

PROFIT and LOSS.				£.	s.	d.
Experiment, N <sup>o</sup> 3. Profit,	-	-	-	4	17	7
11.	-	-	-	2	2	0½
31. Loss,	-	-	-	6	19	7½
				0	1	5½
				6	18	1½

Average, £2l. 6s. 0½d.

## F E D with H O G S.

## EXPENCES.

			£.	s.	d.
Experiment, N <sup>o</sup> 2.	-	-	1	1	11
8.	-	-	1	3	9½
19.	-	-	2	12	3½
28.	-	-	1	1	3
			5	19	3½

Average, £1. 9s. 9½d.

## PRODUCE.

			£.	s.	d.
Experiment, N <sup>o</sup> 2.	-	-	3	7	1
8.	-	-	2	3	4
19.	-	-	4	8	10
28.	-	-	1	11	5½
			11	10	8½

Average, £2. 17s. 8d.

## PROFIT and LOSS.

			£.	s.	d.
Experiment, N <sup>o</sup> 2.	-	Profit,	2	5	2
8.	-	-	0	19	6½
19.	-	-	1	16	6½
28.	-	-	0	10	2½
			5	11	5½

Average, £1. 7s. 10½d.

## F E D with C A T T L E.

## EXPENCES.

			£.	s.	d.
Experiment, N <sup>o</sup> 4.	-	-	1	1	5
10.	-	-	1	3	9½
21.	-	-	2	12	3½
30.	-	-	1	1	3
			5	18	9½

Average, £1. 9s. 8½d.

## PRODUCE.

PRODUCE.						£.	s.	d.
Experiment, N <sup>o</sup> 4.	-	-	-	-	-	2	16	4
10.	-	-	-	-	-	2	12	0
21.	-	-	-	-	-	3	9	0
30.	-	-	-	-	-	1	11	6
Average, £2. 12s. 2½d.						10	8	10

PROFIT and LOSS.						£.	s.	d.
Experiment, N <sup>o</sup> 4.	-	Profit,	-	-	-	1	14	11
10.	-	-	-	-	-	1	8	2½
21.	-	-	-	-	-	0	16	8½
30.	-	-	-	-	-	0	10	3
Average, £1. 2s. 6¼d.						4	10	0½

						£.	s.	d.
Hay expences,	-	-	-	-	-	1	18	2½
Second crop feeded ditto,	-	-	-	-	-	2	1	10½
Fed with hogs ditto,	-	-	-	-	-	1	9	9½
Fed with fundry cattle ditto,	-	-	-	-	-	1	9	8½

From this table we find (as indeed it stands to reason) that feeding the clover, is the cheapest method of using it, making it into hay is more expensive; and feeding one crop, higher still: I should add, that the risque from weather, corresponds exactly with this gradation.

						£.	s.	d.
Hay product,	-	-	-	-	-	3	13	0
Second crop feeded ditto,	-	-	-	-	-	4	11	3
Fed with hogs ditto,	-	-	-	-	-	2	17	8
Fed with fundry cattle ditto,	-	-	-	-	-	2	12	2½

Seeding it yields the greatest crop, but this method is liable to great objections: first, it is, of all others, the most hazardous respecting weather: secondly, it is much the most uncertain in price: and thirdly, I believe it precludes the future use of the clover. After feeding, the field should be ploughed up for corn: all these are great objections. It is true, these totals are the average of several years experience; but the crop is so peculiarly various, that I know not how near the average of these years may be to the general result of many; whereas in all the other applications, I am not solicitous of more extended trials, because they are not liable to near such variations.

	£.	s.	d.
Hay-Profit, . . . . .	1	11	5½
Second crop feeded, ditto, . . . . .	2	6	0½
Fed with hogs, . . . . .	1	7	10½
Fed with cattle, . . . . .	1	2	6½

The only material difference between this table and that of produce, is the superiority of feeding with hogs to that of various cattle, which is remarkable. Nor can I omit the opportunity of observing, that this husbandry of feeding hogs with clover, is one of the most important practices that the generality of the kingdom is unacquainted with. I have been informed that in some countries\*; the farmers, although they use clover, yet have no idea of applying it to this use: but on the contrary, apply that grass only to making hay or feeding sheep; feeding their hogs with whey and milk; and even with beans and pease in the height of summer. The great profit of using clover for the maintenance of hogs, half and three-fourths growth, cannot be disputed; but it will be further examined under the *Book of Cattle*

## S E C T. II.

## Of the TIME of SOWING.

**M**Y experiments under this head would, in a longer course of years, have been more numerous and extended, but much of my time expired before I dreamed of more seasons than one; I even read many writers on the subject of agriculture, without receiving more enlarged ideas; but at last I turned over some that recommended sowing in autumn in preference to the spring. Struck with such a novelty, which I must own I much approved in theory, I immediately determined to try the point fairly.

Clover I had found so extremely profitable, that I did not much doubt but any expence would answer in the culture, that promised an encrease of product. Now sowing clover upon a year's fallow appeared to me to be giving it a great advantage; and a yet greater in sowing it alone, without corn. I had found the advantage of sowing with a first crop, in preference to a second, so great that I naturally concluded the best method of all others must be not to sow it with any. It was these ideas that gave rise to the following trials.

\* Since this was wrote, I have had an opportunity of becoming more acquainted with the husbandry of this kingdom, and I find that a very small portion of it know any thing of this application,



EXPERIMENT N<sup>o</sup> 1.

Culture, expences, and produce, of a rood, in two divisions, field L\*, 1765.

## CULTURE.

One half of this rood was sown with barley on turnip land, in April, 1764; the other half was fallowed through the year 1764, and sown with clover the last week in August, at the rate of three quarters of a peck *per* acre, which was the quantity sown with the corn. Proportions *per* acre,

## Account of the clover sown with corn.

EXPENCES.				£.	s.	d.
Seed,	-	-	-	9	6	6
Sowing,	-	-	-	0	0	3
Mowing and making twice for hay,	-	-	-	0	6	3
				0	13	0
Rent,	-	-	-	0	17	0
				1	10	0
PRODUCE.				£.	s.	d.
40 cwt. of hay, at 42s.	-	-	-	4	4	0
Expences,	-	-	-	1	10	0
Profit,	-	-	-	2	14	0
Carting the hay,	-	-	-	0	1	8
Clear profit,	-	-	-	2	12	4

## Account of that sown alone.

EXPENCES.				£.	s.	d.
Five ploughings,	-	-	-	0	5	0
Three harrowings,	-	-	-	0	0	5
Seed,	-	-	-	0	6	6
Sowing,	-	-	-	0	0	3
Water furrowing,	-	-	-	0	0	6
Mowing and making once,	-	-	-	0	3	0
				0	15	8
Two years rent,	-	-	-	1	14	0
				2	9	8

## PRODUCE.

## PRODUCE.

	£.	s.	d.
18 cwt. of hay at 35s.	1	11	5½
Expences,	2	9	8
Produce,	1	11	5½
Loss,	0	18	2½
	£.	s.	d.
Ploughing,	0	5	0
Harrowing,	0	0	6¼
Carting,	0	0	10
	0	6	4¼
Total loss,	1	4	7¼
Profit by that sown with corn,	2	12	4
Loss on that sown without,	1	4	7¼
Superiority of the former,	3	16	11¼

## OBSERVATIONS.

The ill success that attended the autumnal sowing, was owing to the winter killing the young plants, and the want of the proper season for promoting the vegetation of those that escaped: the crop did not come up near so well as I expected; it was irregular, and after the plants arose I was much surprized that they did not vegetate better. The winter destroyed many of them, in so much that I once thought of ploughing the remainder up. Many weeds arose among them which lowered the quality of the hay. The plants of clover were luxuriant and vigorous in their growth, but too thin for a full crop. I did not keep it for a second mowing, under the conviction of its not answering. This trial, upon the whole, gave me a very bad idea of this new method, which is, beyond all comparison, more expensive and troublesome than the common culture.

EXPERIMENT N<sup>o</sup> 2.

Culture, expences, and produce, of a rood in two divisions, field T, 1766.

## CULTURE.

One of these pieces was sown with the first crop of corn, in spring, 1765; the other was summer fallowed that year, and sown the first week in August. The first was twice mown for hay, the latter came to nothing; the land ploughed up in May, for a fallow for turnips.

## Account of that sown with corn.

EXPENCES.						£.	s.	d.
Seed,	-	-	-	-	-	0	5	4½
Sowing,	-	-	-	-	-	0	0	3
Mowing and making twice,	-	-	-	-	-	0	6	6
						<hr/>		
Rent,	-	-	-	-	-	0	12	1½
	-	-	-	-	-	0	17	0
						<hr/>		
						1	9	1½
PRODUCE.						£.	s.	d.
2 tons hay,	-	-	-	-	-	3	0	0
Expences,	-	-	-	-	-	1	9	1½
						<hr/>		
Profit,	-	-	-	-	-	1	10	10½
Carting hay,	-	-	-	-	-	0	1	8
						<hr/>		
Clear profit,	-	-	-	-	-	1	9	2½

## Account of that sown alone.

EXPENCES.						£.	s.	d.
Six ploughings,	-	-	-	-	-	0	6	0
Harrowing,	-	-	-	-	-	0	0	6
Water furrowing twice,	-	-	-	-	-	0	0	6
Seed,	-	-	-	-	-	0	5	4½
Sowing,	-	-	-	-	-	0	0	3
						<hr/>		
Rent, &c.	-	-	-	-	-	0	12	7½
	-	-	-	-	-	0	17	0
						<hr/>		
Loss,	-	-	-	-	-	1	9	7½
						<hr/>		
Ploughing,	-	-	-	-	-	0	14	4½
Harrowing,	-	-	-	-	-	0	1	1½
						<hr/>		
Loss,	-	-	-	-	-	2	5	1½
Profit by the first,	-	-	-	-	-	1	9	2½
						<hr/>		
Superiority of the former,	-	-	-	-	-	3	14	4

OBSERVATIONS.

## OBSERVATIONS.

This comparison is as decisive as possible, and condemns the autumnal sowing clearer than a volume of reasoning. The fact is, that not a twentieth of the feed vegetates—and not a tenth of what remains stands the winter; at least that has been the event with me both last year and this. However, I shall try it again next year, and if the result turns out the same, I shall be fully convinced that on these soils the practice is utterly ridiculous—and at the same time be extremely clear that it will not pay the expences on any.

EXPERIMENT N<sup>o</sup> 3.

Culture, expences, and produce of a rood in two divisions, field M\*, 1767.

## CULTURE.

One half of this rood was sown with summer-land barley, in April 1766, the other was fallowed and sown the last week in August 1766. The following year they were mown twice for hay. That sown alone made so poor an appearance in the spring that I was going to plough it up in May, but was advised to leave it for a truly fair trial; which I accordingly did, and mowed it with the other, which yielded 5 cwt. of dry hay. The former produced no more than 3 cwt. much of which was weeds. Proportions *per* acre are as follow:

## Account of that sown with corn.

EXPENCES.					£.	s.	d.
Seed,	-	-	-	-	0	4	0
Sowing,	-	-	-	-	0	0	3
Mowing and making twice,	-	-	-	-	0	7	6
					0	11	9
Rent, &c.	-	-	-	-	0	17	0
					1	8	9
PRODUCE.					£.	s.	d.
2 tons hay, at 3 <sup>2</sup> s.	-	-	-	-	3	4	0
Expences,	-	-	-	-	1	8	9
					1	15	3
Profit,	-	-	-	-	0	1	8
Carting,	-	-	-	-	1	13	7
Clear profit,	-	-	-	-			

Account of that sown alone.

EXPENCES					£.	s.	d.
Five ploughings,	-	-	-	-	0	5	0
Three harrowings,	-	-	-	-	0	0	5
Seed,	-	-	-	-	0	4	0
Sowing,	-	-	-	-	0	0	3
Mowing and making twice,	-	-	-	-	0	5	3
					<hr/>		
					0	14	11
Rent, &c.	-	-	-	-	1	14	0
					<hr/>		
					2	8	11
PRODUCE.					£.	s.	d.
24 cwt. hay, at 24s.	-	-	-	-	1	8	9½
Loss,	-	-	-	-	1	0	1½
					<hr/>		
Ploughing,	-	-	-	-	0	12	2½
Harrowing,	-	-	-	-	0	1	1½
Carting,	-	-	-	-	0	1	8
					<hr/>		
					0	14	11½
Total loss,	-	-	-	-	1	15	1½
Profit by sowing with corn,	-	-	-	-	1	13	7
					<hr/>		
Latter superior by	-	-	-	-	3	8	8½

OBSERVATIONS.

The effect of the season on this experiment was the same as the preceding ones. Most of the feed and plants failed, the remainder were very fine and luxuriant ones; but so thin, that the weeds made up too much of the crop. The loss by this method is very great, and would, on any quantity of land, be the ruin of a poor farmer.

GENERAL OBSERVATIONS on this COMPARISON.

No contrast can well be more decisive than this comparison. It is evident that clover sown alone in Autumn is a very hazardous crop; its failing three years successively with me is a proof of this. I am by no means authorized to assert that it will always fail; but I firmly believe that it will never repay such high expences as two years rent, besides tillage. I never tried it; but I should apprehend that the best autumnal sowing would be with very early wheat, which would keep it warm during the winter. Clover is so profitable a culture, that it is much to be regretted any writer should take upon him to recommend a mode of treating it which I will answer for would, if pursued, totally

totally eradicate the use of it from all the farmers in the kingdom. The result of my experiments is so clear, that I think the recommenders of this practice must be merely theoretical farmers, with scarcely any foundation in practice or observation.

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### S E C T. III.

#### Of the QUANTITY of SEED.

**I**T is somewhat surprizing that in an art so universal and so necessary as that of agriculture, the most common of its principles should remain in doubt. Every particular of its practice depends on the conduct of the lower ranks of the people, who have scarce any idea of reducing acknowledged or supposed truths to mathematical demonstration. The general practisers of agriculture pursue it merely for a livelihood; whereas, in all other arts, vanity comes into the question. Some are professed by people of education; others by the inhabitants of towns, and whose trade depends possibly as much on changing with every capricious fashion, as in keeping in the old beaten road. On the contrary, the race of farmers being in general very low in life and education as well as poor in pocket, and of contracted views, have no such spurs to excite them to a spirited exertion of their abilities: and in all states, even of comparative indolence, the misfortune perpetually increases, so that we have no reason to be surprized at the contractions of our husbandmen.

Respecting the quantity of clover seed necessary for an acre of land, the practice of this neighbourhood is to sow about 12lb. but this on average; the variations extend at least from 10 to 14lb. I have never been able to discover any difference in their crops, that seemed merely owing to their quantities of seed. Very good farmers, that manure well, sow 10lb. and get excellent crops; others do the same, who sow 14lb. but slovens, who spend little or no money in manures, on the contrary, get bad crops, whether they sow much or little seed.

This appearance of the common conduct would make one imagine the point a very trivial one; and that the only means to vary the crops of clover is to dung the land well, and keep it always in good heart.

But to assert that the quantity of seed was no matter of consequence, would be to contradict the evidence of common sense itself, and the uniform experience of all ages in every crop that is sown. Keeping the land in excellent order may have a greater effect than any thing else: supposing 12lb. the most advantageous quantity of seed, manuring may render 8lb. far superior; but  
this

this proves nothing relative to the propriety of 12lb. when under a similitude of circumstances with all other quantities. If *fair* experiment is made of divers quantities there can be no doubt but some of them will prove superior to the rest, and the average of numerous superiorities must certainly be the *quantity* of all others most proper.

Authors are much divided on this head; they prescribe with great certainty in their expressions, that such and such quantities are undoubtedly proper. Unfortunately they vary excessively, so that many of them must not only be wrong, but totally wide of the mark. Some are positive that *five* pounds are highly sufficient, while others are equally sanguine for *twenty*. However, none of them speaking from real experiment, authorize their readers to give no ear to reasoning and argument in matters of husbandry.

As I am totally unprejudiced in this dispute, I shall proceed to lay my own trials before the reader; not as conclusive upon all soils, and under all circumstances, but as authority somewhat more genuine than the public has yet received upon this point.

#### EXPERIMENT N° 1.

The last week in April 1765, marked in field L\*, five square perches of fallow barley that had been ploughed for eight times, and sowed a few days before. Sowed clover over the barley, in quantities as follow.

N° 1.	-	-	$\frac{1}{2}$ oz.	-	-	-	5 lb. <i>per</i> acre.
2.	-	-	$\frac{3}{4}$ ditto,	-	-	-	7 $\frac{1}{2}$
3.	-	-	1 oz.	-	-	-	10
4.	-	-	1 $\frac{1}{2}$ ditto,	-	-	-	15
5.	-	-	2 oz.	-	-	-	20

The dryness of the following season prevented my seeing much of the young clover among the barley; only here and there a plant were to be viewed, without stooping to the ground, and looking with great attention for them; the year following, however, they came up thickly. N° 4. and 5. appeared throughout the season much superior to the rest, both in the thickness of the crop, and also in being perfectly free from weeds; whereas the others, and particularly N° 1. and 2. had some in them. The products in hay, weighed as soon as made, of each perch were as follows.

N° 1.	-	-	10 $\frac{1}{4}$ lb.	-	-	15 cwt. <i>per</i> acre.
2.	-	-	14	-	-	1 ton.
3.	-	-	14	-	-	1 ton.
4.	-	-	21	-	-	30 cwt.
5.	-	-	24 $\frac{1}{2}$	-	-	1 ton 15 cwt.

OBSER-

## OBSERVATIONS.

The result of this trial is decisive. It appears very plainly that 20lb. *per* acre is much superior to any other quantity; and the gradation of the increase of product from 10lb. to 20lb. shews that this superiority belongs to feed alone. The appearance of N<sup>o</sup> 1. gave me a sufficient indication of what the event would be, for the crop was evidently, at first sight, too thin, in-  
 somuch that the weeds made some head; notwithstanding the barley having been sown while the land was in as good order as it could be from tillage alone, yet the May-weed and charlock made no slight appearance in the first cutting. The equality of 7½lb. and 10lb. seems to contradict this result; nor can I account for the variation: but I do not think this single exception to the general rise of product with feed, by any means sufficient to weigh down the evidence of the rest of the trial.

EXPERIMENT N<sup>o</sup> 2.

Marked six contiguous square perches of turnip land in field M\*, and after sowing them with barley in the common manner, sowed clover seed on them the end of April 1765. The quantities of seed as follow:

N <sup>o</sup> 1.	with	½ oz.	or	5 lb.	<i>per</i> acre.
2.	-	¼ ditto,	-	7½	
3.	-	1 ditto,	-	10	
4.	-	1¼	-	12½	
5.	-	1½	-	15	
6.	-	2	-	20	

It was sometime after harvest before the clover made any appearance; but N<sup>o</sup> 5. and 6. had much the advantage of the rest in the thickness of the plants. The following summer I mowed the perches twice for hay, and weighing them as soon as made, the amount of the two mowings was as follows:

N <sup>o</sup> 1.	-	-	10½lb.	-	or 15 cwt. <i>per</i> acre.
2.	-	-	10½	-	15 cwt.
3.	-	-	14	-	20 cwt.
4.	-	-	17	-	25 cwt.
5.	-	-	18½	-	27½ cwt.
6.	-	-	28	-	40 cwt.

## OBSERVATIONS.

These perches were mown both times in the same hour, and had equal attention in the making; and yet there are some irregularities in the result which



which I know not how to account for: 5lb. and 7½lb. giving the same product is contrary to the general event of the trial, and very irreconcilable with 15 and 20lb. being so greatly superior. The rise from N° 2. to N° 5. is gradual, but that from N° 5. to N° 6. is very quick, and not consonant to the moderation of the superiority of the other higher numbers. The addition of 5lb. of seed from N° 3. to 5. is attended with an increase of 7½cwt. of hay; but the same quantity of seed added from N° 5. to 6. gives above 12 cwt. increase, which is out of all proportion. But after all, we must not expect that the variation of *effect* in experiments will coincide exactly to those of *cause*. Whoever attends accurately to many trials will, I am convinced, find numerous jarring circumstances, and even contradictions; and, let him be as accurate as he will, he cannot always have it in his power, by reason, to unravel them.

But, in the general, this experiment is satisfactory enough; it evidently appears that the two grand variations of *much* and *little* seed are attended with very important distinctions in the crop. The more the seed, as far as 20lb. undoubtedly the better. This is a plain fact, which is contradicted by no part of the trial; and the great inferiority of 5 or 7lb. shews equally clear, that such portions of seed are much too small for an acre of land.

We may learn from hence, that the calculations which some writers have given of the number of seeds in a pound of clover, and the number of square feet and inches in an acre of land, endeavouring to prove that a few ounces are a sufficiency, or at least a much less quantity than ever used in common, are all fallacious. Such calculations tell very well upon paper—and the proportions between land and seed square extremely well, with no allowances for accident; but bad seed *tells* as well as good, though it will not *grow* at all. nor do such pretty estimates include the failures from accident, after sowing; nor irregularities in the sowing. Such calculations, when rules of conduct are founded on them, we may pronounce mere trifling.

The superiority of the larger quantities of seed, in this trial, is so great, that one should not be surprized at many common husbandmen using more seed than many of their neighbours; and persisting, from observation that they find their account in it. The result of these trials gives much reason to suppose them in the right; and, on the contrary, that the farmers who sow no more than 9 or 10lb. are much under the mark.

#### EXPERIMENT, N° 3.

In the same field as N° 2, marked 8 square perches of potatoe land; sowed them in the common manner with oats, in April 1765, and upon the oats clover, in the following quantities.

N <sup>o</sup> 1.	-	-	$\frac{1}{4}$ oz.	-	or	$2\frac{1}{2}$ lb. <i>per</i> acre.
2.	-	-	$\frac{1}{2}$	-	-	5.
3.	-	-	$\frac{3}{4}$	-	-	$7\frac{1}{2}$ .
4.	-	-	1	-	-	10.
5.	-	-	$1\frac{1}{4}$	-	-	$12\frac{1}{2}$ .
6.	-	-	$1\frac{1}{2}$	-	-	15.
7.	-	-	$1\frac{3}{4}$	-	-	$17\frac{1}{2}$ .
8.	-	-	2	-	-	20.

Viewed them after the oats were mown ; none of them made any great appearance, but N<sup>o</sup> 6, 7, and 8. much exceeded the rest. The following year I mowed them all twice for hay, and weighed the produce as soon as made ; they were as under, at the two cuttings.

N <sup>o</sup> 1.	-	-	$5\frac{1}{4}$ lb.	-	-	or	$7\frac{1}{2}$ cwt. <i>per</i> acre.
2.	-	-	$8\frac{1}{4}$	-	-	-	$12\frac{1}{2}$ .
3.	-	-	$8\frac{3}{4}$	-	-	-	$12\frac{1}{2}$ .
4.	-	-	14	-	-	-	20.
5.	-	-	$17\frac{1}{2}$	-	-	-	25.
6.	-	-	21	-	-	-	30.
7.	-	-	21	-	-	-	30.
8.	-	-	$24\frac{1}{2}$	-	-	-	35.

## OBSERVATIONS.

This experiment, upon the whole, confirms the preceding. The rise of the product, though not exactly regular or uninterrupted with the rise of seed, marks strongly the difference between the larger and the smaller quantities. From  $2\frac{1}{2}$ lb. to  $7\frac{1}{2}$ lb. *per* acre of seed, are evidently so much under the true quantity, that the crops suffer greatly thereby—they are absolutely trivial in comparison of those from 20lb. of seed. The equality of N<sup>o</sup> 2. and 3. and of N<sup>o</sup> 6. and 7. are remarkable ; nor can they from reason be accounted for. But, as I have often remarked, we must not expect every particular in a trial to agree with the general result. It is very plain that the latter may be extremely clear and decisive, without any such certainty being in regular gradation.

The circumstance that I most regret is the not extending the quantity of seed higher than 20lb. In all these three trials that proportion is more beneficial than any smaller quantity ; from whence we cannot gather that 25 or 30lb. would have been better or worse. The idea which I had previously formed that 20lb. would certainly be as high in merit as any larger quantity, was derived rather from common practice than from that totally unprejudiced view of things which every experimental man ought to take. I confess the fault, and shall remedy it next year.

EXPERIMENT N<sup>o</sup> 4.

March 7th, 1766, marked 12 square perches of well fallowed land in field L\*, and sowed them in the common manner with barley, and then with clover seed in the following proportions.

N <sup>o</sup>	1.	with	$\frac{1}{4}$ oz.	or	2 $\frac{1}{2}$ lb. <i>per</i> acre.
2.	-	-	$\frac{1}{2}$	-	5
3.	-	-	$\frac{3}{4}$	-	7 $\frac{1}{2}$ .
4.	-	-	1	-	10.
5.	-	-	1 $\frac{1}{4}$	-	12 $\frac{1}{2}$ .
6.	-	-	1 $\frac{1}{2}$	-	15.
7.	-	-	1 $\frac{3}{4}$	-	17 $\frac{1}{2}$ .
8.	-	-	2	-	20.
9.	-	-	2 $\frac{1}{4}$	-	22 $\frac{1}{2}$ .
10.	-	-	2 $\frac{1}{2}$	-	25.
11.	-	-	2 $\frac{3}{4}$	-	27 $\frac{1}{2}$ .
12.	-	-	3	-	30.

The wetness of the season brought them all up; the large quantities quite thick upon the ground, so as to form quite a carpet, and perfectly free from all weeds; but N<sup>o</sup> 1, 2, and 3, had several in them, and made but a poor appearance, from the thinness of the plants. This was in September, after the oats were carried.

The following spring N<sup>o</sup> 1, 2, and 3, were quite over-run with weeds, particularly N<sup>o</sup> 1. the couch grass had got up much in that perch and N<sup>o</sup> 2. The showers came on so quick that I plainly perceived it would by no means be fair play to let N<sup>o</sup> 1. stand for a crop, as it would certainly turn out little better than a crop of weeds, with here and there a stalk of clover among them: I therefore ploughed it up. The rest were mown twice for hay, and weighed as soon as dry.

N <sup>o</sup>	2.	-	10 $\frac{1}{2}$ lb.	-	or	15 cwt. <i>per</i> acre.
3.	-	-	8 $\frac{3}{4}$	-	-	12 $\frac{1}{2}$ .
4.	-	-	21	-	-	30.
5.	-	-	22 $\frac{3}{4}$	-	-	32 $\frac{1}{2}$ .
6.	-	-	24 $\frac{1}{2}$	-	-	35.
7.	-	-	24 $\frac{1}{2}$	-	-	35.
8.	-	-	26 $\frac{1}{4}$	-	-	37 $\frac{1}{2}$ .
9.	-	-	26 $\frac{1}{4}$	-	-	37 $\frac{1}{2}$ .
10.	-	-	24 $\frac{1}{2}$	-	-	35.
11.	-	-	22 $\frac{3}{4}$	-	-	32 $\frac{1}{2}$ .
12.	-	-	22 $\frac{3}{4}$	-	-	32 $\frac{1}{2}$ .

## OBSERVATIONS.

This trial I must be allowed to think an important one ; and particularly in the circumstance of extending beyond the due quantity. The gradual rise and the succeeding decline mark a medium, which in these comparisons is of great consequence. 20lb. and 22½lb. are equal in produce, and clearly superior to all the other quantities: the rise to these portions and the fall from them prove this sufficiently ; 25lb. is something lower, and 27½ and 30lb. lower still. I must own the products of these quantities surprized me, they so much exceed the usual custom of all countries I have heard of, that I made no doubt but the produce would be very trifling. I expected 30lb. of seed would be but little better than 4 or 5lb. The contrary effect, however, shews that it is a much worse mistake to sow too little clover seed than too much.

As to the irregularities of the result, I can no more account for them in this trial than in the preceding. N<sup>o</sup> 3. producing less than N<sup>o</sup> 2. is contrary not only to the general tenour of the experiment, but also to all ideas respecting such small quantities of seed ; but N<sup>o</sup> 4. rising immediately so very quick, somewhat explains it, by shewing that it must have been owing to some hidden cause, which counteracted the natural course of things : that such causes will often be met with in experimental husbandry, no one who is practised in it will contradict, let the soil, the quantity of it, and all attending circumstances be ever so minutely examined, yet some contradictions will now and then arise that cannot, by reason, be accounted for. The equality of N<sup>o</sup> 6. and 7. of N<sup>o</sup> 8. and 9. and of N<sup>o</sup> 11. and 12. is to be referred in the same manner. A perfect regularity must not be expected in such matters.

EXPERIMENT N<sup>o</sup> 5.

The beginning of April 1766, marked 12 perches of turnip land in field L\*, and sowed them first with barley and then with clover in the following quantities.

N <sup>o</sup>	1.	-	with	-	½ oz.	-	-	5lb. per acre.
2.	-	-	-	-	¾	-	-	7½.
3.	-	-	-	-	1	-	-	10.
4.	-	-	-	-	1½	-	-	12½.
5.	-	-	-	-	1½	-	-	15.
6.	-	-	-	-	1¾	-	-	17½.
7.	-	-	-	-	2	-	-	20.
8.	-	-	-	-	2¼	-	-	22½.
9.	-	-	-	-	2½	-	-	25.
10.	-	-	-	-	2¾	-	-	27½.
11.	-	-	-	-	3	-	-	30.
12.	-	-	-	-	3½	-	-	32½.

M 2

Mowed

Mowed the barley in course. After it was cleared from the field I examined the perches; those that were thick sown made a fine appearance, but N<sup>o</sup> 1. and 2. were neither of them free from weeds, and the clover in N<sup>o</sup> 1. was but thin. The following summer I mowed them twice for hay, and weighed it as soon as made. The product as follows:

N <sup>o</sup> 1.	-	10 $\frac{1}{2}$ lb.	-	or	-	15 cwt. per acre.
2.	-	12 $\frac{1}{2}$	-	-	-	17 $\frac{1}{2}$ .
3.	-	14	-	-	-	20.
4.	-	17 $\frac{1}{2}$	-	-	-	25.
5.	-	24 $\frac{1}{2}$	-	-	-	35.
6.	-	24 $\frac{1}{2}$	-	-	-	35.
7.	-	28	-	-	-	40.
8.	-	29 $\frac{1}{2}$	-	-	-	42 $\frac{1}{2}$ .
9.	-	24 $\frac{1}{2}$	-	-	-	35.
10.	-	17 $\frac{1}{2}$	-	-	-	25.
11.	-	17 $\frac{1}{2}$	-	-	-	25.
12.	-	17 $\frac{1}{2}$	-	-	-	25.

## OBSERVATIONS.

This result is very regular; the rise and fall is almost unbroken; it is only once at a stand in N<sup>o</sup> 10, 11, and 12. being equal. 22 $\frac{1}{2}$ lb. being here superior to 20lb. gives us great reason at least to suppose, that 20lb. is about the medium. My present opinion is, that in a great variety of experiments the most advantageous quantity would vary from 17 to 23, of which 20 is the mean. From this trial we likewise find, as from the preceding, that we had better sow too much than too little seed: upwards of 30lb. are attended with more beneficial effects than the small quantities; and from the equality of N<sup>o</sup> 10, 11, and 12. I conjecture that even much greater quantities, up to 40 and 50lb. perhaps would not turn out so devoid of crop as the very minute assignment of seed to land, in mathematical order—such as a pound or two to an acre. However thick clover seed is sown, it has from its thickness one advantage which thin sown crops universally want; that of smothering the weeds. Authors may dwell as much as they please on the strength of vegetables that are thinly sown; but my little experience tells me, that in unhoed broad cast crops the case is very different. Besides, in the present case, the dispute does not turn on a plant standing singly, but on its neighbours being of the same sort as itself, or weeds; the latter will assuredly be there if the clover is not, and as certainly do the mischief which is apprehended of the other. The result of this trial is contrary to the ideas which I had entertained of clover: 10 or 12lb. appeared to me a quantity sufficient; and so unprejudiced am I in this point, that I shall *doubt* as long as it is prudent to doubt, and desist from sowing such quantities in the fields at large, until repeated experience convinces me the practice is indubitably just.

EXPERIMENT N<sup>o</sup> 6.

The last week in April 1766, marked 12 perches of fallow land in field M\*; sowed them in the common manner with barley,<sup>a</sup> and then with clover in the following proportions :

N <sup>o</sup> 1.	-	-	$\frac{1}{4}$ oz.	-	or	-	2 $\frac{1}{2}$ lb. <i>per acre.</i>
2.	-	-	$\frac{1}{2}$	-	-	-	5.
3.	-	-	$\frac{3}{4}$	-	-	-	7 $\frac{1}{2}$ .
4.	-	-	1	-	-	-	10.
5.	-	-	1 $\frac{1}{4}$	-	-	-	12 $\frac{1}{2}$ .
6.	-	-	1 $\frac{1}{2}$	-	-	-	15.
7.	-	-	1 $\frac{3}{4}$	-	-	-	17 $\frac{1}{2}$ .
8.	-	-	2	-	-	-	20.
9.	-	-	2 $\frac{1}{4}$	-	-	-	22 $\frac{1}{2}$ .
10.	-	-	2 $\frac{1}{2}$	-	-	-	25.
11.	-	-	2 $\frac{3}{4}$	-	-	-	27 $\frac{1}{2}$ .
12.	-	-	3	-	-	-	30.

Viewed them after the barley was carried; all from N<sup>o</sup> 4. upwards carried a very good appearance; N<sup>o</sup> 3. indifferent; N<sup>o</sup> 2. bad, with many weeds; N<sup>o</sup> 1. had but three plants of clover, the rest all weeds. I left this till the spring, and no more then appearing, I ordered it to be ploughed up. The rest were mown for hay, of which they yielded as follows :

N <sup>o</sup> 2.	-	-	12 $\frac{1}{4}$ lb.	-	or	-	17 $\frac{1}{2}$ cwt. <i>per acre.</i>
3.	-	-	14	-	-	-	20.
4.	-	-	15 $\frac{3}{4}$	-	-	-	22 $\frac{1}{2}$ .
5.	-	-	22 $\frac{3}{4}$	-	-	-	32 $\frac{1}{2}$ .
6.	-	-	28	-	-	-	40.
7.	-	-	31 $\frac{1}{2}$	-	-	-	45.
8.	-	-	22 $\frac{3}{4}$	-	-	-	32 $\frac{1}{2}$ .
9.	-	-	22 $\frac{3}{4}$	-	-	-	32 $\frac{1}{2}$ .
10.	-	-	15 $\frac{3}{4}$	-	-	-	22 $\frac{1}{2}$ .
11.	-	-	15 $\frac{3}{4}$	-	-	-	22 $\frac{1}{2}$ .
12.	-	-	21	-	-	-	30.

## OBSERVATIONS.

More consistent in the parts with the general result, than is found in many trials of this sort. 20 lb. are here superior to the other quantities, and the higher portions very far beyond the small ones. The superiority of N<sup>o</sup> 12.

<sup>a</sup> All the preceding trials, as well as this, were sown at the rate of 3 bushels *per acre.*

to N<sup>o</sup> 10. and 11. is remarkable ; nor can I at all account for it. This instance excepted, I think the general effect is pretty regular. That less than 20lb. of seed should not be sown is strongly proved ; for the want of stocking the land well with plants makes a difference of more than double, which is very great. The connection between the quantity of seed and the quantity of weeds I am convinced is very great ; the more seed, the fewer of those enemies.

EXPERIMENT N<sup>o</sup> 7.

At the same time as the preceding experiment, marked 14 perches of turnip land in field M\*, that had been thoroughly dunged for, at the rate of twenty loads *per* acre ; sowed them with barley in the common manner ; and after the barley with clover, in the following quantities :

N <sup>o</sup> 1.	-	with	-	$\frac{1}{2}$	-	-	2 $\frac{1}{2}$ lb. <i>per</i> acre.
2.	-	-	-	$\frac{1}{2}$	-	-	5.
3.	-	-	-	$\frac{1}{2}$	-	-	7 $\frac{1}{2}$ .
4.	-	-	-	1	-	-	10.
5.	-	-	-	1 $\frac{1}{4}$	-	-	12 $\frac{1}{2}$
6.	-	-	-	1 $\frac{1}{2}$	-	-	15.
7.	-	-	-	1 $\frac{3}{4}$	-	-	17 $\frac{1}{2}$ .
8.	-	-	-	2	-	-	20.
9.	-	-	-	2 $\frac{1}{4}$	-	-	22 $\frac{1}{2}$ .
10.	-	-	-	2 $\frac{1}{2}$	-	-	25.
11.	-	-	-	2 $\frac{3}{4}$	-	-	27 $\frac{1}{2}$ .
12.	-	-	-	3	-	-	30.
13.	-	-	-	3 $\frac{1}{4}$	-	-	32 $\frac{1}{2}$ .
14.	-	-	-	3 $\frac{1}{2}$	-	-	35.

After the barley, viewed the perches attentively ; the small quantities of seed made an indifferent appearance, from the number of weeds that were in them: those which were thickly sown carried a different countenance; but N<sup>o</sup> 1. was so over-run with spreading weeds, that I ploughed it up for a fallow with some adjoining perches ; the appearance of the weeds threatened too formidable an attack to let them stand. The rest I mowed twice for hay, of which, weighed as soon as dry, the product was as follows.

N <sup>o</sup> 2.	-	-	12 $\frac{1}{2}$ lb.	-	or	-	17 $\frac{1}{2}$ cwt. <i>per</i> acre.
3.	-	-	12 $\frac{1}{4}$	-	-	-	17 $\frac{1}{2}$ .
4.	-	-	22 $\frac{1}{4}$	-	-	-	32 $\frac{1}{2}$ .
5.	-	-	24 $\frac{1}{2}$	-	-	-	35.
6.	-	-	31 $\frac{1}{2}$	-	-	-	45.
7.	-	-	28	-	-	-	40.
8.	-	-	28	-	-	-	40.

N <sup>o</sup> 9.	with -	24½	- or -	35 cwt. <i>per</i> acre
10.	- -	22½	- -	32½.
11.	- -	22½	- -	32½.
12.	- -	17½	- -	25.
13.	- -	14	- -	20.
14.	- -	14	- -	20.

## OBSERVATIONS.

A new distinction arises in the result of this experiment: we find that when the land is well manured less seed is requisite than when it enjoys no such advantages; 15 lb. *per* acre in this trial are superior to any higher portion. This event, is very contrary to all the preceding for 20 lb. in them had the Advantage of any other quantities now this distinction I apprehend is owing to the manure giving the vegetative power to the clover sufficient to enable every plant to shoot out a number of stalks: whereas in those plants which grow in land not in such good condition, they do not make the same shoots; for I had observed that in the pieces I had adjoining, single plants in the unmanured soil made by no means the appearance they did in these perches which were manured. I mean respecting the tillowing over the land: and thickening to the destruction of weeds. This is the most important part of these variations, for I have great reason to think from the whole course of these trials, that the degree or thickness of the crop is the point which a farmer should principally have in view: if he sows too much seed the land is overloaded, and has not power to force an advantageous crop: but when the land is well manured, fewer seeds are requisite, for the power of the dung renders one plant as spreading as several, when no dung is applied. It is in this manner that a smaller quantity of seed answers to a larger, when the soil is in great heart. I must be allowed at the same time to observe, that this result is perfectly consistent with the event of the trials I have made on the proper quantities of corn to be sown on an acre of land:—these quantities vary in proportion to the fertility of the soil; the same principle that effects the one, is, I apprehend, the occasion of the other. It is to be remarked, that neither the rise, nor the fall, are once broken in this experiment; which is a regularity of result not often met with.

EXPERIMENT, N<sup>o</sup> 8.

Marked twelve perches of cabbage land in field L\*, the middle of April 1766; sowed them with barley in the common manner after a manuring with a rich compost of town dung, at the rate of twelve loads *per* acre. Upon the barley, sowed clover in the following quantities:



## ARTIFICIAL GRASSES.

N <sup>o</sup>	1. with	-	$\frac{1}{2}$ oz.	-	or	-	5lb. per acre.
2.	-	-	$\frac{3}{4}$	-	-	-	7 $\frac{1}{2}$
3.	-	-	1	-	-	-	10
4.	-	-	1 $\frac{1}{4}$	-	-	-	12 $\frac{1}{2}$
5.	-	-	1 $\frac{1}{2}$	-	-	-	15
6.	-	-	1 $\frac{3}{4}$	-	-	-	17 $\frac{1}{2}$
7.	-	-	2	-	-	-	20
8.	-	-	2 $\frac{1}{4}$	-	-	-	22 $\frac{1}{2}$
9.	-	-	2 $\frac{1}{2}$	-	-	-	25
10.	-	-	2 $\frac{3}{4}$	-	-	-	27 $\frac{1}{2}$
11.	-	-	3	-	-	-	30
12.	-	-	3 $\frac{1}{4}$	-	-	-	32 $\frac{1}{2}$

Viewed them after harvest, and all of them made a very good appearance: N<sup>o</sup> 1. and 2. however, were inferior to the rest. The following summer mowed them twice for hay, and weighed it as soon as made: the product as follows:

N <sup>o</sup>	1.	-	21lb.	-	-	or 30 cwt. per acre.
2.	-	-	21	-	-	30.
3.	-	-	26 $\frac{1}{4}$	-	-	37 $\frac{1}{2}$ .
4.	-	-	26 $\frac{1}{4}$	-	-	37 $\frac{1}{2}$ .
5.	-	-	28	-	-	40.
6.	-	-	26 $\frac{1}{4}$	-	-	37 $\frac{1}{2}$ .
7.	-	-	26 $\frac{1}{4}$	-	-	37 $\frac{1}{2}$ .
8.	-	-	24 $\frac{1}{2}$	-	-	35.
9.	-	-	21	-	-	30.
10.	-	-	21	-	-	30.
11.	-	-	17 $\frac{1}{2}$	-	-	25.
12.	-	-	17 $\frac{1}{2}$	-	-	25.

## OBSERVATIONS.

This experiment is particularly satisfactory: it shows that when the foil is well manured, or in great heart, that the quantity of seed should be less than upon foils not so well done by; and likewise, that the virtue of particular quantities is not of such effect as on poor land. 15lb. is here the most advantageous portion; but 12 $\frac{1}{2}$  on one side, and 17 $\frac{1}{2}$  and 20 on the other, come very near it in product; much nearer than the inferior quantities usually advance when the foil is not manured. Notwithstanding such a general similarity in products, yet the rise and fall are not once broken: and it is observable in this trial, that the largest quantity of seed, is inferior to the smallest, but then it goes no lower than 5lb. whereas it rises to 32 $\frac{1}{2}$ . This must be owing to the same cause, that produces more clover from 15lb. than

than from 20lb. although the latter quantity on unmanured soils, is superior to the other. The dung makes the plants to thicken their stalks, and spread to the destruction of weeds, in a much greater degree than on weaker land: and all these trials give us reason to believe that the great point is to gain a very *thick* crop, and that the quantity of seed should be proportioned to that effect: a smaller one being necessary in one case, and a larger in the other: it is evident, that on very rich soils, or others well manured, that 15lb. produces as thick a crop as 20 on inferior ones.

EXPERIMENT, N<sup>o</sup> 9.

At the same time as the last trial, marked 15 square perches of turnip land, and sowing them in the common manner with barley at the rate of 3 bushels *per* acre, sowed each with clover in the the following proportions.

N <sup>o</sup> 1.	-	with	1	4oz.	-	or	2½lb. <i>per</i> acre.
2.	-	-	-	½oz.	-	-	5.
3.	-	-	-	¾	-	-	7½.
4.	-	-	-	1	-	-	10.
5.	-	-	-	1¼	-	-	12½
6.	-	-	-	1½	-	-	15.
7.	-	-	-	1¾	-	-	17½.
8.	-	-	-	2	-	-	20.
9.	-	-	-	2¼	-	-	22½.
10.	-	-	-	2½	-	-	25.
11.	-	-	-	2¾	-	-	27½.
12.	-	-	-	3	-	-	30.
13.	-	-	-	3¼	-	-	32½.
14.	-	-	-	3½	-	-	35.
15.	-	-	-	4	-	-	40.

All clover this year arose in rich land so quickly, that before harvest it was easily to be seen among the barley: many barley crops were even destroyed by it. I remarked, that from N<sup>o</sup> 10. to N<sup>o</sup> 15. the clover did not rise near so high as in the preceding ones, though it was very thick on the ground; which must be owing to the thickness flunting the growth. N<sup>o</sup> 1, came to nothing but weeds; it will not therefore be included in the following table.

The rest were in October manured from a compost hill, consisting of equal parts of hog and horse dung, rotten coal ashes, mortar rubbish, and turf, that had all been mixed several times; the proportion was 12 loads *per* acre. The following summer they were mown twice for hay, and weighed when made. The produce of both mowings as follows;

N <sup>o</sup> 2.	-	-	21lb.	-	or	-	30 cwt. <i>per</i> acre.
3.	-	-	24½	-	-	-	35.
4.	-	-	28	-	-	-	40.
5.	-	-	31½	-	-	-	45.
6.	-	-	35	-	-	-	50.
7.	-	-	31½	-	-	-	45.
8.	-	-	28	-	-	-	40.
9.	-	-	21	-	-	-	30.
10.	-	-	24½	-	-	-	35.
11.	-	-	21	-	-	-	30.
12.	-	-	14	-	-	-	20.
13.	-	-	17½	-	-	-	25.
14.	-	-	14	-	-	-	20.
15.	-	-	14	-	-	-	20.

## OBSERVATIONS.

Fifteen pounds an acre in this trial, are much superior to any other quantity: indeed, more so than I should have supposed; but there are some very unaccountable variations; N<sup>o</sup> 6 being 10 cwt. superior to N<sup>o</sup> 4. is a rise that appears extravagant, and the fall from N<sup>o</sup> 6. to N<sup>o</sup> 8 greater than reason would have allowed of; ~~the distance between 6 and 12 in product is also uncommon; and 12, 14 and 15, being equal,~~ is very strange: N<sup>o</sup> 10, being superior to 9, is contrary to all the rest of the experiment. These irregularities, tho' they must make one rather cautious in fixing much reliance on the proportions between the several parts of the trial; yet do they not at all impeach the general effect. From 12 to 17lb. we may safely pronounce to be the most advantageous quantities of feed for an acre of land, under the circumstances of this experiment: this important point is independant of those irregularities mentioned.—We may also safely determine, that small quantities, such as from 2½ to 10lb, are much inferior, and that large quantities, from 20 to 40, are also to be rejected, no variations in the particulars at all invalidate these testimonies; and a confirmation of them is the agreement with preceding trials. The crops in general are small, but that is much owing to the unfavourableness of the season in making them, which reduced the weight of the clover.

## GENERAL OBSERVATIONS ON these EXPERIMENTS.

My trials on the quantity of clover seed for an acre of land are, upon the whole, pretty decisive, though not numerous; and will, I flatter myself, be found of more utility to my brother farmers, than the plentiful reasonings and conjectures with which they have, in books, been amused. That a clearer idea may be formed of their result, I shall draw the particulars of the experiments

riments into averages; first, those unmanured; and then such as were manured.

U N M A N U R E D.

PRODUCT *per acre* from 2½lb. of SEED.

In experiment, N <sup>o</sup>	3.	-	-	-	-
	4.	-	-	-	came to nothing.
	6.	-	-	-	ditto.
	7.	-	-	-	ditto.
	9.	-	-	-	ditto.

Ton. cwt. qr.  
0 7 2

If this total be divided into five parts, the average will be 1 cwt. 2 qr.

PRODUCTS *per acre* from 5lb. of SEED.

In experiment, N <sup>o</sup>	1.	-	-	-	-
	2.	-	-	-	-
	3.	-	-	-	-
	4.	-	-	-	-
	5.	-	-	-	-
	6.	-	-	-	-

Ton. cwt. qr.

0 15 0  
0 15 0  
0 12 2  
0 15 0  
0 15 0  
0 17 2

Total, - - -  
Average, 15 cwt.

4 10 0

PRODUCTS *per acre* from 7½lb. of SEED.

In experiment, No	1.	-	-	-	-
	2.	-	-	-	-
	3.	-	-	-	-
	4.	-	-	-	-
	5.	-	-	-	-
	6.	-	-	-	-

Ton. cwt. q.

1 0 0  
0 15 0  
0 12 2  
0 12 2  
0 17 2  
1 0 0

Average, 16 cwt. 0 qrs. 18 lb.

4 17 2

PRODUCE *per acre* from 10lb. of SEED.

In experiment No.	1.	-	-	-	-
	2.	-	-	-	-

Ton. cwt. qr.

1 0 0  
1 0 0

N 2

Carried over 2 0 0

Brought over,	-	-	-	-	-	2	0	0
In experiment N <sup>o</sup> 3.	-	-	-	-	-	1	0	0
4.	-	-	-	-	-	1	10	0
5.	-	-	-	-	-	1	0	0
6.	-	-	-	-	-	1	2	2
Total,	-	-	-	-	-	6	12	2

Average, 1 ton, 2 cwt. 0 qr. 9 lb.

PRODUCTS *per* acre from 12½ lb. of SEED.

						Ton.	cwt.	qr.
In experiment N <sup>o</sup> 3.	-	-	-	-	-	1	5	0
4.	-	-	-	-	-	1	5	0
5.	-	-	-	-	-	1	12	2
6.	-	-	-	-	-	1	5	0
Total,	-	-	-	-	-	7	0	0

Average, 1 ton. 8 cwt.

PRODUCTS *per* acre from 15 lb. of SEED.

						Ton.	cwt.	qr.
In experiment, N <sup>o</sup> 1.	-	-	-	-	-	1	10	0
2.	-	-	-	-	-	1	7	2
3.	-	-	-	-	-	1	10	0
4.	-	-	-	-	-	1	15	0
5.	-	-	-	-	-	1	15	0
6.	-	-	-	-	-	2	0	0
Total,	-	-	-	-	-	9	17	

Average, 1 ton. 12 cwt. 3 qr. 18 lb.

PRODUCTS *per* acre from 17½ lb. of SEED.

						Ton.	cwt.	lb.
In experiment N <sup>o</sup> 3.	-	-	-	-	-	1	10	0
4.	-	-	-	-	-	1	15	0
5.	-	-	-	-	-	1	15	0
6.	-	-	-	-	-	2	5	0
Total,	-	-	-	-	-	7	15	0

Average, 1 ton. 16 cwt. 1 qr.

PRODUCTS

PRODUCTS *per acre* from 20lb. of SEED.

								Ton. cwt. qr.
In experiment N <sup>o</sup> 1.	-	-	-	-	-	-	-	1 15 0
2.	-	-	-	-	-	-	-	2 0 0
3.	-	-	-	-	-	-	-	1 15 0
4.	-	-	-	-	-	-	-	1 17 2
5.	-	-	-	-	-	-	-	2 0 0
6.	-	-	-	-	-	-	-	1 12 2
Total,	-	-	-	-	-	-	-	11 0 0

Average, 1 ton. 16 cwt. 2 qr. 18 lb.

PRODUCTS *per acre* from 22½lb. of SEED.

								Ton. cwt. qr.
In experiment N <sup>o</sup> 4.	-	-	-	-	-	-	-	1 17 2
5.	-	-	-	-	-	-	-	2 2 2
6.	-	-	-	-	-	-	-	1 12 2
Total,	-	-	-	-	-	-	-	5 12 2

Average, 1 ton. 17 cwt. 1 qr. 9 lb.

PRODUCTS *per acre* from 25lb. of SEED.

								Ton. cwt. lb.
In experiment N <sup>o</sup> 4.	-	-	-	-	-	-	-	1 15 0
5.	-	-	-	-	-	-	-	1 15 0
6.	-	-	-	-	-	-	-	1 2 2
Total,	-	-	-	-	-	-	-	4 12 2

Average, 1 ton. 10 cwt. 3 qrs. 9lb.

PRODUCTS *per acre* from 27½lb. of SEED.

								Ton. cwt. qr.
In experiment N <sup>o</sup> 4.	-	-	-	-	-	-	-	1 12 2
5.	-	-	-	-	-	-	-	1 5 0
6.	-	-	-	-	-	-	-	1 2 2
Total,	-	-	-	-	-	-	-	4 0 0

Average, 1 ton. 6 cwt. 2 qr. 18lb.

, PRODUCTS

Products *per* acre from 30lb. of SEED.

						Ton.	cwt.	qr.
In experiment N <sup>o</sup> 4.	-	-	-	-	-	1	12	2
5.	-	-	-	-	-	1	5	0
6.	-	-	-	-	-	1	10	0
Total,	-	-	-	-	-	4	7	2

Average, 1 ton. 9 cwt. 0 qr. 18 lb.

PRODUCT *per* acre from 32½ lb. of SEED.

						Ton.	cwt.	qr.
In experiment N <sup>o</sup> 5.	-	-	-	-	-	1	5	0

## RECAPITULATION.

						Ton.	cwt.	qr.	lb.
Average from 22½ lb.	-	-	-	-	-	1	17	1	9
Ditto from 20 lb.	-	-	-	-	-	1	16	2	18
Ditto from 17½ lb.	-	-	-	-	-	1	16	1	0
Ditto from 15 lb.	-	-	-	-	-	1	12	3	18
Ditto from 25 lb.	-	-	-	-	-	1	10	3	9
Ditto from 30 lb.	-	-	-	-	-	1	9	0	19
Ditto from 12½ lb.	-	-	-	-	-	1	8	0	0
Ditto from 27½ lb.	-	-	-	-	-	1	6	2	18
Ditto from 32½ lb.	-	-	-	-	-	1	5	0	0
Ditto from 10 lb.	-	-	-	-	-	1	2	0	9
Ditto from 7½ lb.	-	-	-	-	-	0	16	0	18
Ditto from 5 lb.	-	-	-	-	-	0	15	0	0
Ditto from 2½ lb.	-	-	-	-	-	0	1	2	0

This general review of the averages shews us the gradation of quantities in the order of merit; but perhaps the best authority (as including the greater variety of circumstances) will arise from taking different mediums of these averages, as the view will then be less complex.

## From 2½ to 7½ lb.

						Ton.	cwt.	qr.	lb.
Product from 2½,	-	-	-	-	-	0	1	2	0
— from 5,	-	-	-	-	-	0	15	0	0
— from 7½,	-	-	-	-	-	0	16	0	18
Total,	-	-	-	-	-	1	12	2	18
Average, 10cwt. 3 qr. 15 lb.									

From

## From 10 to 15 lb.

Product	from 10 lb.	from 12½,	from 15,	Ton.	cwt.	qr.	lb.
Product from 10 lb.	-	-	-	1	2	0	9
from 12½,	-	-	-	1	8	0	0
from 15,	-	-	-	1	12	3	18
Total,	-	-	-	4	2	3	27

Average, 1 ton. 7 cwt. 2 qr. 18 lb.

## From 17½ to 22½.

Product	from 17½,	from 20,	from 22½,	Ton.	cwt.	qr.	lb.
Product from 17½,	-	-	-	1	16	1	0
from 20,	-	-	-	1	16	2	18
from 22½,	-	-	-	1	17	1	9
Total,	-	-	-	5	10	0	27

Average, 1 ton. 16 cwt. 2 qr. 27 lb.

## From 25 to 32½.

Product	from 25 lb.	from 27½,	from 30,	from 32½,	Ton.	cwt.	qr.	lb.
Product from 25 lb.	-	-	-	-	1	10	3	9
from 27½,	-	-	-	-	1	6	2	18
from 30,	-	-	-	-	1	9	0	18
from 32½,	-	-	-	-	1	5	0	0
Total,	-	-	-	-	5	11	2	17

Average, 1 ton. 7 cwt. 3 qr. 18 lb.

From	17½ to 22½,	25 to 32½,	10 to 15,	2½ to 7½,	Ton.	cwt.	qr.	lb.
From 17½ to 22½,	-	-	-	-	1	16	2	27
25 to 32½,	-	-	-	-	1	7	3	18
10 to 15,	-	-	-	-	1	7	2	18
2½ to 7½,	-	-	-	-	0	10	3	15

This little table shews, in a very small compass, the state of this part of the culture of clover. It appears very clearly that the most advantageous quantity of seed is about 20 lb. and that the quantities from thence to so high as 32½ lb. are nearly upon a par in product with those from 7½ to 15 lb. but upon this it should be remarked, that this comparison not including the value of the seed, this near equality would be reversed; for the price of so much seed would much



much more than balance the difference of product. As to the portions from  $2\frac{1}{2}$  to  $7\frac{1}{2}$ , they are evidently to be quite rejected.

The quantity that here possesses the superiority, viz. about 20lb. I should remark, is the portion used in some places in common:—but the general practice is very different; not rising on a medium, I presume, higher than 10 or 12 pounds: now this general practice is evidently mistaken; there can be little doubt, but that a change to about 20lb. would be attended with much more beneficial effects: it is therefore to be wished, that this alteration may take place; and I cannot but recommend to landlords, to take the proper methods of persuading their tenants, at least to try this point in as fair and candid a manner as its consequence demands; that they may discover how far the comparison on their respective soils would turn out in the manner it has with me.—But in all these points, let the unprejudiced set all general reasonings at defiance; never let them condemn a practice merely because it is contrary to that of their neighbourhood,

### MANURED.

PRODUCTS *per acre* from  $2\frac{1}{2}$ lb. of SEED.

Experiment, No. 7.	-	-	came to nothing
8.	-	-	ditto.
9.	-	-	ditto.

PRODUCTS *per acre*, from 5lb. of SEED.

					Ton. cwt. qr.
In experiment, No. 7.	-	-	-	-	0 17 2
8.	-	-	-	-	1 10 0
9.	-	-	-	-	1 10 0
Total,					<u>3 17</u>

Average, 1 ton, 5 cwt. 3 qrs. 9 lb.

PRODUCT *per acre* from  $7\frac{1}{2}$ lb. of SEED.

					Ton. cwt. qr.
In experiment, No. 7.	-	-	-	-	0 17 2
8.	-	-	-	-	1 10 0
9.	-	-	-	-	1 15 0
Total,					<u>4 2 2</u>

Average, 1 Ton, 7 cwt. 2q.

PRO-

PRODUCT *per* acre from 10lb. of SEED.

					Ton. cwt. qr.
In experiment, N <sup>o</sup>	7.	-	-	-	1 12 2
	8.	-	-	-	1 17 2
	9.	-	-	-	2 0 0
Total,					5 10 0
Average, 1 ton, 16 cwt. 2 qr. 18 lb.					

PRODUCT *per* acre from 12½lb. of SEED.

					Ton. cwt. qr.
In experiment, N <sup>o</sup>	7.	-	-	-	1 15 0
	8.	-	-	-	1 17 2
	9.	-	-	-	2 5 0
Total,					5 17 2
Average, 1 ton, 19 cwt. 0 qr. 18 lb.					

PRODUCT *per* acre from 15lb. of SEED.

					Ton. cwt. qr.
In experiment, N <sup>o</sup>	7.	-	-	-	2 5 0
	8.	-	-	-	2 0 0
	9.	-	-	-	2 10 0
Total,					6 15 0
Average, 2 ton, 5 cwt.					

PRODUCT *per* acre from 17½lb. of SEED.

					Ton. cwt. qr.
In experiment, N <sup>o</sup>	7.	-	-	-	2 0 0
	8.	-	-	-	1 17 2
	9.	-	-	-	2 5 0
Total,					6 2 2
Average, 2 ton, 0 cwt. 2 qr. 18 lb.					

PRODUCT *per* acre from 20 lb. of SEED.

					Ton. cwt. qr.
In experiment, N <sup>o</sup>	7.	-	-	-	2 0 0
	8.	-	-	-	1 17 2
Total,					3 17 2
Average, 2 ton, 17 cwt. 2 qr. 18 lb.					

Brought over	-	-	-	-	3	17	2
In experiment, N <sup>o</sup> 9.	-	-	-	-	2	0	0
Total,	-	-	-	-	5	17	2
Average, 1 ton, 19 cwt. 0 qr. 18 lb.							

PRODUCTS *per* acre from 22½ lb.

					Ton.	cwt.	qr.
In experiment, N <sup>o</sup> 7.	-	-	-	-	1	15	0
8.	-	-	-	-	1	15	0
9.	-	-	-	-	1	10	0
Total,	-	-	-	-	5	0	0
Average, 1 ton, 13 cwt. 1 qr. 9 lb.							

PRODUCT *per* acre from 25 lb. of SEED.

					Ton.	cwt.	qr.
In experiment, N <sup>o</sup> 7.	-	-	-	-	1	12	2
8.	-	-	-	-	1	10	0
9.	-	-	-	-	1	15	0
Total,	-	-	-	-	4	17	2
Average, 1 ton, 12 cwt. 2 qr.							

PRODUCTS *per* acre from 27½ lb. of SEED.

					Ton.	cwt.	qr.
In experiment, N <sup>o</sup> 7.	-	-	-	-	1	12	0
8.	-	-	-	-	1	10	0
9.	-	-	-	-	1	10	0
Total,	-	-	-	-	4	12	0
Average, 1 ton, 10 cwt. 2 qr. 18 lb.							

PRODUCTS *per* acre from 30 lb. of SEED.

					Ton.	cwt.	qr.
In experiment, N <sup>o</sup> 7.	-	-	-	-	1	5	0
8.	-	-	-	-	2	5	0
9.	-	-	-	-	2	0	0
Total,	-	-	-	-	3	10	0
Average, 1 ton, 3 cwt. 1 qr. 9 lb.							

PRODUCT

PRODUCT *per acre* from 32½ lb. of SEED.

					Ton. cwt. qr.
In experiment, N <sup>o</sup> 7.	-	-	-	-	1 0 0
8.	-	-	-	-	1 5 0
9.	-	-	-	-	1 5 0
Total,	-	-	-	-	3 10 0
Average, 1 ton, 3 cwt. 1 qr. 9 lb.					

Product *per acre* from 35 lb. of SEED.

					Ton. cwt. qr.
In experiment, N <sup>o</sup> 7.	-	-	-	-	1 0 0
9.	-	-	-	-	0 0 0
Total,	-	-	-	-	2 0 0
Average, 1 ton.					

PRODUCT *per acre* from 40 lb. of SEED.

					Ton. cwt. qr.
In experiment No. 9.	-	-	-	-	1 0 0

## RECAPITULATION.

					Ton. cwt. qr. lb.
Product from 15 lb.	-	-	-	-	2 5 0 0
— from 17½	-	-	-	-	2 0 2 18
— from 12½ and from 20	-	-	-	-	1 19 0 18
— from 10	-	-	-	-	1 16 2 18
— from 22½	-	-	-	-	1 13 1 9
— from 25	-	-	-	-	1 12 2 0
— from 27½	-	-	-	-	1 10 2 18
— from 7½	-	-	-	-	1 7 2 0
— from 5	-	-	-	-	1 5 3 9
— from 30 and 3½	-	-	-	-	1 3 1 9
— from 35 and 40	-	-	-	-	1 0 0 0
— from 2½	-	-	-	-	0 0 0 0

This table shews the particular average of each quantity but that the view of the subject may be complete, I shall give the mediums of these:

From  $2\frac{1}{2}$  to  $7\frac{1}{2}$ .

	Ton.	cwt.	qr.	lb.
Product from $2\frac{1}{2}$	0	0	0	0
— from 5	1	5	3	9
— from $7\frac{1}{2}$	1	7		0
Total,	2	13		

Average, 19 cwt. 3 qr. 3 lb.

From 10 to 15 lb.

	Ton.	cwt.	qr.	lb.
Product from 10 lb.	1	16	2	18
— from $12\frac{1}{2}$	1	19	0	18
— from 15	2	5	8	0
Total	6	0	3	9

Average, 1 ton. 0. cwt. 1qr. 3lb

From  $17\frac{1}{2}$  to  $22\frac{1}{2}$ .

	Ton.	cwt.	qr.	lb.
Product from $17\frac{1}{2}$	2	0	2	18
— from 20	1	19	0	18
— from $22\frac{1}{2}$	1	13	1	9
Total,	5	13	0	17

Average, 1 ton, 17 cwt. 2 qr. 24 lb.

From 25 to 30 lb.

	Ton.	cwt.	qr.	lb.
Product from 25 lb.	1	12	2	0
— from $27\frac{1}{2}$	1	10	2	18
— from 30	1	3	1	9
Total,	4	6	1	27

Average, 1 ton, 8 cwt. 3 qr. 9 lb.

From  $32\frac{1}{2}$  to 40 lb.

	Ton.	cwt.	qr.	lb.
Product from $32\frac{1}{2}$	1	3	1	0
— from 35	1	0	0	0
— from 40	1	0	0	0
Total,	3	3	1	9

Average, 1 ton, 1 cwt. 0 qr. 12 lb.

From

						Ton. cwt. qr. lb.
From 10 to 15	-	-	-	-	2	0 1 3
17½ to 22½	-	-	-	-	1	17 2 24
25 to 30	-	-	-	-	1	8 3 9
32½ to 40	-	-	-	-	1	1 0 12
2½ to 7½	-	-	-	-	0	17 3 3

The comparisons between the quantities, when manured and not manured, will appear as follows:

PRODUCT.						SEED.			
Ton. cwt. qr. lb.									
2	0	1	3	-	manured,	-	-	-	10 to 15
1	16	2	27	-	unmanured,	-	-	-	17½ to 22½
1	17	2	24	-	manured,	-	-	-	17½ to 22½
1	7	3	18	-	unmanured	-	-	-	25 to 32½
1	8	3	9	-	manured,	-	-	-	25 to 30
1	7	2	18	-	unmanured,	-	-	-	10 to 15
1	1	0	12	-	manured,	-	-	-	32½ to 40
0	10	3	15	-	unmanured,	-	-	-	2½ to 7½
0	17	2	3	-	manured,	-	-	-	2½ to 7½

From 10 to 15 of the unmanured, classing with 25 to 30, of the manured, is a contradiction to the comparison in general, but such variations are beyond my power to account for: the general result is so consistent with the cast of the experiments in particular, and with reason, that I should attribute it to chance, rather than impeach in the least the principal points of the contrast. The grand lesson deducible from these experiments is, that 12½ lb. of seed is the proper quantity for an acre of land manured:—But this circumstance undoubtedly answers to a superior natural fertility: so that very rich land should not be sown thicker than manured. Unmanured soils, or those which are but in common order, require 20 lb. This is the result on my soils:—Other cultivators, who possess different ones, should try the point for themselves: but I should in general remark, that I have found no difference between clay and gravel. This at least gives some reason for supposing the variations of seed do not depend on the *sort*, but the *richness* of the soil.

## S E C T. IV.

## Of WHITE DUTCH CLOVER.

**T**HIS grass has of late years much advanced in fame ; many writers of character have sounded its praises, and the quantity of it sown every year is very considerable. Reading and hearing so much of it induced me to try some experiments on the culture. The number of them is small ; and not having any great encouragement from my first attempt, I never extended my trials to large pieces of land ; I can only value the register of these trials comparatively with what the public has already received. As this consists only in general assertions, I shall venture the following trials rather to incite others to enquire further into the subject than as a complete discussion even on one foil.

EXPERIMENT N<sup>o</sup> 1.

In April 1765, sowed in field L\*, 5 square perches of white Dutch clover with 5 ounces of seed, which is at the rate of 10lb. *per* acre. The land had been well summer fallowed in 1764, receiving six ploughings and two harrowings in all. No corn was sown with it. It came up very regularly and well, notwithstanding the succeeding drought. I weeded it in June, and mowed it the beginning of August, and made it into hay, which when dry weighed 39lb. This product is very small, for the clover was not above six inches high when mown ; the dry weather prevented its being more. The proportion is but 11 cwt. 16lb. *per* acre. I shall insert the expences, &c. in proportion to an acre ; this I think absolutely necessary that it may be known, not only that this method of culture is unprofitable, but also in what degree it is so.

EXPENCES.				£.	s.	d.
Six ploughings,	-	-	-	0	6	0
Two harrowings and rolling,	-	-	-	0	0	3
Water furrowing,	-	-	-	0	0	6
Seed,	-	-	-	0	5	0
Sowing,	-	-	-	0	0	3
Carried over,				12		d.

	£.	s.	d.
Brought over,	0	12	0
Weeding,	0	4	9
Mowing and making,	0	4	6
	1	1	3
Rent,	1	14	0
	2	15	3
PRODUCE.			
11 cwt. 16lb. of hay, at 40s.	1	2	3
Value of the after feed for sheep,	0	6	0
	1	8	3
	£.	s.	d.
Expences,	2	15	3
Produce,	1	8	3
	1		
Loss,	£.	s.	d.
Ploughing,	0	6	0
Harrowing,	0	0	4½
Carting,	0	0	10
	0	7	2½
Total loss,	1	14	2½

# OBSERVATIONS.

White clover has, I believe, been chiefly used for laying down lawns and grafs-plots that are within the view of houses ; for which purpose it appears, in one respect, to be very well calculated ; the plants run upon the ground until they mat together quite like a carpet ; and if they were constantly fed with sheep, I should apprehend they would have a constant verdure : for I observed when I fed off these perches by herdling them in, that very soon after the sheep were gone (although it was autumn) the young leaves appeared thick upon the ground, so that not a single spot was to be seen uncovered. In this respect I take white clover to be valuable ; but the experience of this trial is sufficient to prove that for hay it is a mere trifle. The growth is so flight in heighth that I am convinced the product in hay can never amount to any thing considerable. But I shall, next year, feed off these perches as fast as the clover rises, which will give me an opportunity of discovering farther the real nature of the plant.





## PRODUCE.

	£.	s.	d.
Keeping 160 sheep 8 days at 2½d.	1	18	1
Expences,	0	17	0
Profit,	1	1	1

## OBSERVATIONS.

This profit is much more than I apprehended would accrue from any acre of white clover; the smallness of the plant, the not rising higher than a few inches from the ground, and the very trifling produce when mowed, had led me to conclude that the crop in all cases would prove unprofitable. The experience, however, of this year, in the present trial, convinces me, as well as the preceding, that it is only proper for sheep feed. And I have some reason, from the appearance of this piece the latter part of the year, to conclude that the profit would not be of long duration; for notwithstanding the creeping nature of it, and its quite matting over the surface, yet much couch grass had got up in it, and seemed, I thought, to gain upon the clover. The sweetness of the latter kept the sheep from eating the former, which gave it a great advantage. I apprehended that the superior strength of this rank weed would, in a few years, quite eradicate the clover. Some other natural grass also began to appear, but not such beneficial sorts as would promise to form a tolerable pasture instead of the clover.

The account of this piece will, upon the whole, appear in the clearest way stated as follows:

	£.	s.	d.
Profit the second year,	0	16	4
Ditto the third,	1	1	1
Loss the first,	1	17	5
Clear profit,	1	14	2½
	0	3	2½

Which is *per acre per annum*, 1s. 0¾d.

This state of the whole account is very unfavourable to the crop sown in this manner; and from the evidence of these experiments I am very much inclined to think that white clover sown alone can be no object to a farmer: the common broad clover will, I am confident, far exceed it for the common purposes of husbandry. The great use of it seems to be the general application of it to sow mixed with seeds for laying down land to grass: in that manner I doubt not of its utility.

EXPERIMENT N<sup>o</sup> 4.

Turnip fallowed five square perches in field M\*, in 1764; the tillage began in October 1763; the turnips were sown on five ploughings, and drawn for cattle in December; the land was then ploughed on to the ridge; in March it was stirred again; the beginning of April, a third time. The 13th of May 1765, ploughed it and harrowed in buck wheat, and upon that 5 oz. white clover, which are 10lb. *per* acre. After the harvesting of the buck wheat I viewed the young clover, and found it thick on the ground, but of very trifling growth. Herdled sheep upon it the following year, as often as it was ready to feed. It maintained 5 sheep just a week in all. The proportions *per* acre are as follow.

EXPENCES.										£.	s.	d.
Seed,	-	-	-	-	-	-	-	-	-	0	5	0
Sowing,	-	-	-	-	-	-	-	-	-	0	0	3
										0	5	3
Rent, &c.	-	-	-	-	-	-	-	-	-	0	17	0
										1	2	3
PRODUCE.										£.	s.	d.
Keeping 160 sheep a week, at 2½d.	-	-	-	-	-	-	-	-	-	1	13	4
Expences,	-	-	-	-	-	-	-	-	-	1	2	3
Profit,	-	-	-	-	-	-	-	-	-	0	11	1

## OBSERVATIONS.

Buck wheat, from this trial, seems a very proper grain to sow grafs seeds with: the clover came up well, was a regular thick crop, and grew very fast in pushing out many little leaves after each feeding of the sheep; but notwithstanding this, the crop in profit is nothing, compared with the common culture of broad clover. I have no conception that this plant can answer the farmer's purpose, unless it be that of mixing with common grafs seeds, to lay land permanently to pasture. It appears well adapted to spread upon the ground, and fill up the vacancies of the other sorts. Sheep are very fond of it.

EXPERIMENT N<sup>o</sup> 5.

Continued those perches during the year 1767; they kept five sheep five days.

## EXPENCES.

		EXPENCES.		
		£.	s.	d.
Rent, &c.		0	17	0
		PRODUCE.		
		£.	s.	d.
Keeping 160 sheep 5 days, at 2½d.		1	3	6
Expences,		0	17	0
Profit,		0	6	6

## OBSERVATIONS.

This trial gives me no opinion of the white clover. The profit is trifling ; and the circumstance of the product of it being less than last year, particularly against it ; but this I attribute to the successive rains bringing up the couch grass too powerfully for the white clover, without any assistant to repulse.

As a substitute for broad clover, and to be used for the same purposes, this sort I am convinced will never answer ; in laying a field permanently to grass, a portion of the seed would, I doubt not, be of excellent use ; for the natural grasses (after a most complete preparation) would prevent the couch from getting a head, and then the white clover would thicken at the root, and add greatly to the crop of all the perpendicular growing plants.

## C H A P. II.

## CULTURE and PRODUCE of TREFOILE.

**T**HIS grafs has feldom been cultivated in thefe parts by common farmers, nor have I heard of any gentlemen that have tried much of it. One little farmer in this parifh, has had feveral fmall crops of it for feed, and that is all the culture I have heard of in this neighbourhood. Upon the dry lands beyond Woodbridge, the farmers fow large quantities of it for feeding fheep, preferring it to broad clover from its lafting longer in the ground. My trials upon it have not been numerous, but the few I made I fhall venture before the public, becaufe no writer has given any experiments on it;—all concerning it to be met with in books being mere reasonings, and general obfervations.

EXPERIMENT, N<sup>o</sup> I.

In field L\*, ploughed up a piece of barley stubble unto the ridge for the winter, in November 1764. In March ploughed down the ridges; ftirred it again the beginning of April; a fourth earth the end of the fame month. The firft week in May, marked 5 fquare perches, and ploughed and harrowed in 5 ounces of feed, which is at the rate of 10lb. *per* acre. Notwithstanding the fevere drought which fucceeded, it came up very regularly and well, but grew to no head till September, in which month I fed it down with fheep, of which it kept 5 for 4 days, at two feedings. The proportions *per* acre of this trial are as follow:

EXPENCES.					£.	s.	d.
Five ploughings,	-	-	-	-	9	5	0
Harrowing,	-	-	-	-	0	0	1½
Seed,	-	-	-	-	0	2	6
Sowing,	-	-	-	-	0	0	3
Carried over,					0	7	10½

Brought over,  
Rent, &c.

£.	s.	d.
0	7	10½
0	17	0
<hr/>		
1	4	10½

## PRODUCE.

Keeping 160 sheep 4 days, at 2½d.

Loss,

Ploughing,  
Harrowing,

Total loss,

£.	s.	d.
0	19	2
0	5	8½
0	5	0
0	0	4½
<hr/>		
0	5	4½
0	11	1

## OBSERVATIONS.

Considering the extreme unfavourableness of the season, and that the crop had the expences of tillage to pay, this loss I do not think great; the appearance of the trefoile was very favourable after feeding, for the land was well stocked with plants; and many young shoots appeared in a peculiar manner, in little bunches, almost close to the ground. I conjectured, from viewing it, that it would answer better for feeding sheep than mowing for hay; but of this I must have more experience before I venture to pronounce.

EXPERIMENT N<sup>o</sup> 2.

Continued the perches of N<sup>o</sup> 1. during the year 1766; the trefoile did not begin to sprout until the beginning of April. The 23d of May, mowed it; the produce, weighed green, was 280lb. when made into hay it weighed 56lb. July 18th, mowed it again; the weight green 230lb. and when in hay 47lb. I expected to have had another small cutting, but it arose no more even to sheep feed. The whole produce green is 510lb. which is *per acre* 7 ton, 5 cwt. 80lb. Dry it was 103lb. which is 1 ton, 8 cwt. *per acre*.

## EXPENCES.

Mowing and making, &c. twice,  
Rent, &c.

£.	s.	d.
0	10	6
0	17	0
<hr/>		
1	7	6

## PRODUCE.

1 ton, 8 cwt. of hay at 35s.

£.	s.	d.
2	9	0

Brought

	£.	s.	d.
Brought over,	2	9	0
Expences,	1	7	6
Profit,	1	1	6
Carting twice,	0	1	8
Clear profit,	0	19	10

## OBSERVATIONS.

The product of this experiment in hay much surpris'd me: I did not expect that trefoil, which does not grow to any height like clover and many other grasses, would yield so much hay: I do not think it would have paid better in sheep feed. However, the profit is but small: twenty shillings *per* acre not being sufficient for an artificial grass, while the common clover so much exceeds it: no field of the latter in good management, but what will yield much more than 20s.

EXPERIMENT, N<sup>o</sup> 3.

Continued the same piece of trefoil during the year 1767. The appearance it made in March and April, gave me no great expectation of a beneficial crop this year, for in several spots the trefoil was quite spoiled by the couch grass, and it appeared weak in all. Mowed it the middle of June; produce green, 140lb dry, in hay 21lb. After this, it came no more to the scythe; but I fed it with sheep in September, it maintained 5, one day.

	EXPENCES.	£.	s.	d.
Mowing and making,	-	0	5	3
Rent, &c.	-	0	17	0
		1	2	3

	PRODUCE.	£.	s.	d.
Six cwt. of hay at 30s.	-	0	9	0
Keeping 160 sheep a day at 2½d.	-	0	4	9
		0	13	9
		Expences,		

	£.	s.	d.
Expences,	-	-	-
Produce,	-	-	-
Loss,	-	-	-
Carting,	-	-	-
Total,	0	7	4

## OBSERVATIONS.

It appears upon the whole, that trefoil will not answer in this method of culture, upon land that will produce common broad clover: the loss, though not considerable in the sum itself, is great in comparison with a crop that would have been very profitable. I am of opinion, from attentively viewing these perches, that trefoil will not, upon our wet soils, answer in any way whatever: of this I am so much convinced, that I shall never try it in large after this year.

EXPERIMENT N<sup>o</sup> 4.

Culture, expences and produce, of 5 acres, field A\*, 1767.

Sown among the barley of 1766. Mowed it for feed, August 5th; got it in the 13th; produce three ton of hay, and 12 bushels of feed; 9 bushels, 21lb. the best; the rest drofs.

EXPENCES.				£.	s.	d.
Seed, 56lb.	-	-	-	0	14	0
Sowing,	-	-	-	0	1	3
Harrowing,	-	-	-	0	1	0
Mowing,	-	-	-	0	9	0
Harvesting,	-	-	-	0	5	9
Thrashing,	-	-	-	2	16	6
				4	7	6
Rent, &c.	-	-	-	4	5	0
				8	12	6
PRODUCE.				£.	s.	d.
9 bushels 21lb. feed,	-	-	-	5	5	10
3 tons of hay,	-	-	-	3	15	0
Carried over,	-	-	-	9	0	10
Expences,						



	£.	s.	d.
Brought over,	9	0	10
Expences,	8	12	6
Profit, 1s. 8d. per acre.	0	8	4
Carting,	0	4	2
Clear profit, 10d per acre,	0	4	2

## OBSERVATIONS.

The extreme wetness of the year, almost ruined this crop; for it not only lessened the product of seed, but rendered it of a poor quality, and brought up many weeds which damaged the hay; otherwise it would have been valued at considerably more than 25s. a ton; for trefoil hay, notwithstanding the seed is formed, is a very rich sort, and much affected by most cattle. The seed sometimes (especially in dry years) proves, as I am told, a profitable crop: the clearing it from the land time enough for a fallow for wheat, is likewise an advantageous circumstance.

## GENERAL REMARK.

If the reader will allow me to offer an opinion on this culture in general, on moist or wet soils; I should recommend every farmer to sow broad clover instead of it; I am persuaded, it cannot be equally advantageous to use trefoil, although some crops may pay, and even be profitable: it has not near the strength of clover, to keep couch grass under, which in moist soils is a point of much consequence; and the great difference in produce renders the contrast decisive. How far it might answer to sow 5 or 6lb. an acre of it with other seeds, for laying lands to grass, I shall not pretend to determine; in such husbandry it may be useful.

I apprehend it lasts much longer in dry soils than in moist ones: the farmers about Woodbridge, sow it in preference to clover, because it lasts longer; but in our wet loams, clover will certainly last longer: and upon those dry soils, the crops may also be more beneficial than with us, which is not improbable, where the pernicious sorts of natural grasses do not attack it with equal violence. I have great reason to believe, that no artificial grass that is sown in the common manner, and treated in the common method, can thrive to great profit, unless it be strong enough to get the better of the weeds and natural grass.

## C H A P. III.

## O F L U C E R N E.

**T**HIS plant has been an object of great attention in agriculture, almost from the first records of the art: it has been traced even to the time of Darius. It was cultivated by the farmers of Greece, and made a principal figure in the husbandry of the Romans. It is particularly treated of by the authors who first wrote on the subject of agriculture, after the obscure ages which followed the dissolution of the Roman empire. The culture of it has been common in Italy, and the southern provinces of France; so long, that it was probably as much a descendant of the Roman husbandry, as the culture of wheat itself; that is, the existence of it was not owing to the works of the ancient writers, but to common practice delivered down from father to son; which is very credible of a perennial plant; notwithstanding the fury of the northern invaders. We find from Columella, that lucerne was greatly cultivated in Spain: but what the fate of it was in that country, in the disastrous ages, is not known.

The transplantation of lucerne from the southern into the more northerly part of Europe, is not very accurately known; our husbandry writers during the last century, speak of it only as a part of French culture; but do not give us the least reason to think it was cultivated in England. Nor have we any knowledge of the first introduction. I believe Tull is the first writer who speaks experimentally of it. The progress, however, which it made in England was very slight, if any at all:—But a greater spirit for improvements in husbandry arising, men enquired more assiduously concerning it. Mr. Millar, in a very popular book (his Gardener's Dictionary) gave directions for cultivating in the drill way; which method was followed by many gentlemen, without any rivalry, till Mr. Rocque appeared: he insisted on the propriety of cultivating it in the broad cast mode like clover;

and quoted the practice of his own country, France, where it is so cultivated in common. These methods were defended by their respective partizans: in a few years after, the reverend Mr. Harte, canon of Windsor, introduced another method of culture, invented by M. De Chateauvieu, of Geneva, that of transplantation: and as that very learned gentleman's book (*The Essays on Husbandry*) was excellently written; and the instructions contained in it, evidently the offspring of experience, this method, created a new party; so that for several years last past, the cultivators of lucerne have arranged themselves under these different banners; and disputed very warmly on the respective excellencies, each of his own practice.

Respecting my own conduct, I began the culture of lucerne in the spring of 1763, which was before I had heard of Mr. Rocque, or Mr. Harte had published. I therefore naturally followed Mr. Millar: but afterwards I practised both broad-cast sowing and transplanting, and formed various comparisons of them. I flatter myself, without the least prejudice to any method.

The natural divisions of this chapter in general, will be into the following sections.

- I. Culture drilled.
- II. Culture broad-cast.
- III. Culture transplanted.
- IV. Comparison of these methods.

## S E C T. I.

## Culture, Expences, and Produce of LUCERNE, drilled.

**U**PON reading Mr. Millar's article, *Medica*, I was seized with a very strong inclination to try a plant which promised so fairly in speculation; and I determined to pursue that gentleman's instructions as minutely as I could; in which disposition I formed the following trial.

EXPERIMENT, N<sup>o</sup> I.

Culture, expences, and produce of two acres, Field P. 1763.

## CULTURE.

These acres yielded spring corn (after a fallow) in 1762, with which clover was sown. But I determined early in the year 1763, to sow it with lucerne; for the land was in excellent order, and the soil just what Mr. Millar recommended: I ploughed up the clover in February, greatly to the chagrin of my bailey, who expostulated strongly against this conduct; he insisted that I should presently be twenty pounds out of pocket: but depending on my authority, I strenuously persisted in my design, and assured him that half an acre of the lucerne would far exceed many acres of the clover. In March two earths more were given; which totally destroyed the clover, and brought the land into pretty good tilth. I ploughed it again the beginning of April, and harrowed it three times, till it was quite fine: the last week of the same month, I ploughed it again the fifth time, and harrowed it three times more; leaving the land quite flat and in excellent order.

But here let me pause: this spring fallowing, though I think it brought this light soil into order sufficient for most crops; yet I must own, the preparation was not precisely what it ought to have been. Lucerne should certainly follow a summer fallow; but I was too eager in my husbandry to wait for this, and so committed an error of certain importance.

As soon as the last plowing and harrowings were done, I struck the whole two acres into equally distant rows, 2 feet asunder, with lines and

hoes, and dropping the seed by hand, covered it with rakes; the quantity 12lb. which is the direction of Mr. Millar. This tedious method of drilling, was for want of a drill plough, and not at all belonging to the culture itself; for which reason, as in other cases of the same kind, I shall charge the expence only of using a drill plough.

The weeds appeared as soon as the lucerne, and kept so infernal a conflict with it during the whole summer, that it appeared almost impossible to destroy them. Myself, the bailey, and the men, had been used to no other hoeing than that of turnips; the men undertook the first, the beginning of June, at 6s. an acre, but when they finished, I found they had only cut the spaces between the rows, and now and then pulled a large weed out of the rows, but had not, in general, attempted to clean the rows themselves. My bailey ought to have taken better care; but he had no stomach to the experiment. To remedy the evil, I set an old man to work upon the rows, on whose care I could depend: he clearly extirpated the weeds as he proceeded, but he went so slow, that the whole would not have been done by Christmas. I turned one furrow in each interval with a common plough; I then set another in, but still I found that the weeds, from successive showers, arose in one place as fast as they destroyed them in another. In July it was again hoed over by turnip hoers, at 5s. an acre, and this operation left the land tolerably clean; but yet many weeds were left in the rows, and more soon appeared: then I gave another horse hoeing. During all this time the lucerne itself made a weakly starved appearance, and was very thin in the rows, probably from the seed being bad. The middle of September I cut it, and made the product into hay, the quantity of which was 3 cwt. I was so chagrined at the event of the trial, that I then determined, as many others have done in the same situation, to have nothing more to do with lucerne. I expected to see it shoot early in the spring, but in that I was also disappointed: I then ordered the piece to be ploughed up and sown with oats, much to the triumph of all my people. I preserved, however, three rows for a further trial of it.

	EXPENCES.	£.	s.	d.
Five ploughings,	- - - - -	0	10	0
Six harrowings,	- - - - -	0	2	0
Seed,	- - - - -	0	11	0
Drilling,	- - - - -	0	9	9
First hand hoeing,	- - - - -	0	12	0
Second ditto,	- - - - -	0	11	0
Third ditto,	- - - - -	0	10	0
Two horse hoeings,	- - - - -	0	3	0
Carried over,				2 19 9

	£.	s.	d.
Brought over, - - - - -	2	19	9
Mowing, - - - - -	0	2	0
Making, &c. - - - - -	0	1	6
	<hr/>		
Rent, &c. - - - - -	3	3	3
	1	14	0
	<hr/>		
	4	17	3

PRODUCE.

3 cwt. lucerne hay, suppose 2s. 6d. per cwt. - - -	0	7	6
	<hr/>		
Loss, - - - - -	4	9	9
	<hr/>		
	£.	s.	d.
Ploughing, - - - - -	0	15	0
Harrowing, - - - - -	0	3	0
Drilling, - - - - -	0	0	6
Horse hoeing, - - - - -	0	3	0
	<hr/>		
	1	1	6
	<hr/>		
Total loss, 2l. 15s. 7½d. per acre, - - - - -	5	11	3
	<hr/>		

OBSERVATIONS.

This is a register of errors, rather than a complete experiment ; but the whole was so natural in a young headstrong farmer, that I think the exhibiting the consequences may be as useful to others, in the same situation, as the account of the most successful trial. I shall proceed, and offer my own reflections on the blunders I committed.

Instead of succeeding spring corn, the land ought certainly to have had a year's fallow ; for previous *cleaning the soil* is certainly a saving of *cleaning the crop* : but if that plan was not followed, instead of drilling so early, the land should have been left a month in the fine condition I had reduced it to, in that time it would have become an absolute thicket of weeds ; these should have been ploughed in, the harrows set to work again, to level the surface, and then have drilled the seed ; by which conduct at least half the trouble and expence of hoeing and cleaning would have been saved.

In the next place I committed an error in not expending more money in cleaning it from weeds. It is true, the expence I *did* submit to was very great ; but then it should have been considered, that for want of more all was thrown away, and the crop accordingly ploughed up. Five or six men should have been set to work at once, and three or four times in the season, and followed by women to draw every weed out of the rows : heavy as the expence would have

have been, yet it would have preserved the crop; and it is certainly very bad economy to be sparing of expence the first year of a perennial crop.

The last error I committed was ploughing it up: after so much expence bestowed on it, it certainly should have been left long enough to shew itself the year following, that if the appearance was promising the weeds might be totally eradicated by a fresh attention; which conduct, in case of failure, would have left time sufficient to prepare for turnips. Upon the whole, this first essay on lucerne was very badly managed, and a mark rather of my ill husbandry than a want of merit in the plant.

#### EXPERIMENT N<sup>o</sup> 2.

Culture, expences, and produce of ten square perches, field P, 1764.

In the preceding pages I mentioned the sowing three rows of the lucerne of experiment N<sup>o</sup> 1. they were 20<sup>o</sup> perches long, and having on each side a space of two feet of ground, were just half a perch broad; consequently the whole amount was 10 square perches. The smallness of this quantity of land was a great inducement to try the plant fairly.

It was the 20th of April before the lucerne had sprouted. May 3d, I hand hoed the rows *completely*, making the labourer draw out every weed that grew among the plants. A few days after this hoeing I began much to repent that I had ploughed the rest up; the rows, though very thin of plants (for many had died) but very beautiful; the colour was a fine healthy green, and the branches and leaves extremely luxuriant. It grew away remarkably fast, so that it was two feet high, on an average, by the 25th of May: I then cut it, and weighing the green lucerne, it amounted to 112lb. the land being the sixteenth of an acre, the produce of an acre would in proportion be 16 cwt. I confined one of my cart horses to the stable, and the 112lb. lasted him exactly two days and two nights. Now supposing the value of thus keeping a horse to be 6*d.* a week more than the common joist, this is 2*s.* and the value of the 112lb. is 7*d.* or *per* acre 8*s.* 4*d.*

The 28th of May I horse hoed the rows by going about with our small Suffolk swing plough in each interval: my meaning was to turn a small ridge of earth up in the middle of each interval, leaving the rows upon a small strip between those ridges; but I found in executing it that it would not do so, for there was not room; the second furrow turned the mould over into the first: however, I managed without burying the plants. In a day or two after this horse hoeing I hand hoed the rows, by cutting close to them, and pulling the weeds from among the plants; the number of weeds that troubled me now was not great. The effect of these operations was soon visible; for the lucerne sprouted out with great luxuriance, and promised a better crop than the first had been. I did not find it requisite to give any more cleaning  
to



to it before another cutting. It was again ready to cut the 9th of July, when I mowed it again, and weighing it as before, it amounted to 162lb. which I gave to a cart horse as before, and it kept him four days; consequently at 2s. a week was worth 1s. 2d. which makes 1 cwt. worth 9d.

After this cutting there was but a small appearance of weeds, nevertheless I treated the land the same as before, only as the former horse hoeing had thrown up part of a ridge of earth in the middle of each interval, that which I now gave was the reverse of the last, viz. splitting that ridge; throwing half of it to each row, and leaving an open furrow in the middle of each interval, after which I hand hoed it as before. The lucerne grew immediately with great vigour, and was in a few days several inches high. The 28th of August I cut it a third time; the weight green 197lb. this produce, as before, I gave to a horse, which I confined to the stable for that purpose; it lasted him four days and a half, which keeping, at 2s. a week, comes to 1s. 3d. which is 8d. *per* cwt. After this cutting I horse hoed the rows again the contrary to the last time, and also hand hoed them: these operations I gave that the land might be kept quite loose and in fine order; for the weeds were thoroughly destroyed, so that I do not think I had now twenty to deal with in the whole piece; and this spirited exertion against these arch enemies I am confident is the only way to cultivate lucerne with success. The last cutting was the 13th of October, the weight of which was 172lb. which maintained a horse three days, consequently is, at the former rate, 10d. or 6d. *per* cwt. After this cutting I horse and hand hoed the rows as before, and left them in that manner for the winter.

I shall state the expences and produce proportioned *per* acre; the balance of the first year was 2l. 15s. 7½d.

EXPENCES.				£.	s.	d.
First hand hoeing,	-	-	-	0	6	9
Mowing, &c.	-	-	-	0	1	0
First horse hoeing,	-	-	-	0	1	6
Second hand hoeing,	-	-	-	0	5	6
Mowing, &c.	-	-	-	0	1	0
Second horse hoeing,	-	-	-	0	1	6
Third hand hoeing,	-	-	-	0	5	0
Mowing, &c.	-	-	-	0	1	0
Third horse hoeing,	-	-	-	0	1	6
Fourth hand hoeing,	-	-	-	0	4	6
Mowing, &c.	-	-	-	0	1	0
Raking together, carrying and loading, four times	-	-	-	0	5	9
Fourth horse hoeing,	-	-	-	0	1	6
Carried over,	-	-	-	1 16		



				£.	s.	d.
Brought over,	-	-	-	1	16	9
Fifth hand hoeing,	-	-	-	0	4	0
				2	0	9
Rent, &c.	-	-	-	0	17	0
				2	17	9
				£.	s.	d.
PRODUCE. Ton. cwt. lb.						
May 25th, First cutting,	-	-	1 3 16	0	8	4
July 9th, Second ditto,	-	-	1 8 16	0	18	8
Aug. 28th, Third ditto,	-	-	0 28 16	1	0	0
Oct. 13th, Tenth ditto,	-	-	1 4 64	0	13	4
				4	11	96
				3	0	4
Expences,	-	-	-	2	17	9
Profit,	-	-	-	0	2	7
Horfe hoeing,	-	-	-	0	4	0
Profit,	-	-	-	0	2	7
Loss,	-	-	-	0	1	5

## OBSERVATIONS.

The product of this experiment exceeded the utmost of my expectations; but large as it has proved, yet the profit is absolutely nothing: this shews that the culture is prodigiously expensive. Lucerne, it is true, being a perennial crop, must not be decisively pronounced on from the experience of only two years. In the first, it was in its infancy; and the second year I apprehend by no means equals succeeding ones; so that the criterion of the culture depends on future experience.

	£.	s.	d.
The loss upon the first crop being	2	15	7½
And on the second	0	1	5
The total	2	16	10½

loss on the two years, is a great amount; besides the trouble and attention of two years, and to the loss of that profit which would have resulted from common crops. All this proves, that lucerne, in this method of this culture, cannot do for common farmers. It would be in vain to talk to them

them of future profit, to wait two years, and then have a loss of 2*l.* 16*s.* 10*d.* would ruin three-fourths of the nation; whatever were the succeeding profits, would matter nothing; a new race of farmers must enjoy them, the old ones would be all in goal.

If it be observed, that the first management of this crop was faulty, I agree to it; but at the same time, let it be remembered, that a more perfect conduct would have been attended with greater expences: witness a year's fallow. And I am confident, the balance of the account, at the two year's end, would have been a greater loss: the lucerne indeed would have promised a greater future profit.

The total amount *per* acre, at four cuttings, has been 4 ton, 11 cwt. 96lb. which has maintained one horse the following time:

	<i>Days..</i>
The first cutting, - - - - -	32.
The second, ditto, - - - - -	64.
The third, ditto, - - - - -	72.
The fourth, ditto, - - - - -	48.
Total, - - - - -	<u>216.</u>

The first cutting was the 25th of May; from that day to the end of October there are 159 days: so that this lucerne maintained at the rate of one horse throughout the season; and another 57 days or 8 weeks. It is of particular consequence to know these proportions, as they are of much utility to such persons as would chuse to proportion their lucerne to certain heads of cattle.

### EXPERIMENT N<sup>o</sup> 3.

Culture, expences, and produce of 10 perches, field P. 1765.

#### CULTURE.

This is the continuation of the preceding trial: I began the operations of the new year by hand-hoeing the whole surface; and at the same time weeding the rows. The lucerne shooted out its branches very luxuriantly, the beginning of April; and I had the pleasure to find them much thicker than they were the last year. Cut it for the first time the 9th of May, and weighing the produce directly, it amounted to 316lb. I gave it to two cart horses in the stable, and it lasted them three days and an half; which at 2*s.* a week is 2*s.* or 8½*d.* *per* cwt. After this cutting, I horse-hoed the rows; and I should remark, to save repetitions, that in horse-hoeing I constantly

reverse the last; throwing the moulds to and from the plants alternately. As soon as it was done, the rows were hand-hoed as last year.

June 19th, cut it the second time: the season has been as unfavourable as can be conceived. May 23d, came a slight shower or two; from thence till the 14th of June, no rain fell, the grass fields suffered extremely, yet this cutting of the lucerne, weighed 363 lb. which surprized me greatly; and showed that the product was almost independant of the weather. It lasted two horses three days and a half; and amounts therefore to 2s. as before, or 6½d. per cwt. It is somewhat remarkable, that 316 and 363 lb. should maintain them alike. I horse-hoed the intervals as before, but had no occasion to hand-hoe the rows.

July 31st, cut it the third time; during this whole growth, no rain fell, it was a severe drought, that burnt up all the natural grasses, clover, &c. and yet it was surprizing to see how the lucerne throve throughout it; it constantly retained a fine healthy verdure, and the weight of the produce amounted to 405 lb. which is undoubtedly very remarkable. It maintained 2 horses 4 days, which comes to 2s. 3d. or 7d. per cwt.

Horse-hoed after this cutting as the former, but found no occasion to hand-hoe. Cut it again the 14th of September: the droughts lasted till the 13th of August, and in that fortnight, no more than in the former growth, did the lucerne suffer in the least; which shews a most valuable quality in it. This cutting weighed 404 lb. and lasted two horses four days, amounting to 2s. 3d. and 7d. per cwt. as before.

Directly after this cutting, I horse-hoed as formerly, and also hand-hoed the rows, and plucked out the weeds that had arose in them. The lucerne sprouted again with much luxuriance, and afforded me another cutting the 6th of November, but this weighed no more than 280 lb. lasted 2 horses 2 days; which is 1s. 1½d. or 5d. per cwt. I then gave another horse-hoeing, which I ordered to be cut 6 inches deep at least; it threw up so high a ridge in the middle of the interval, that much of the lucerne was buried under the falling moulds; but this I disregarded, not thinking it any evil, as winter was coming.

EXPENCES.				£.	s.	d.
First hand-hoeing and weeding,	-	.	-	0	6	0
First mowing, &c.	-	-	-	0		6
Raking and loading, &c.	-	-	-	0		6
First horse-hoeing,	-	-	1	0		6
Second hand-hoeing,	-	-	-	0		6
Second mowing,	-	-	-	0		2
Raking, loading, and carrying,	-	-	-	0		6
Second horse-hoeing,	-	-	-	0	1	6

Carried over, £. 0 15 8

	£.	s.	d.
Brought over,	0	15	8
Third mowing	0	1	3
Raking together, loading and carting,	0	1	6
Third horse-hoeing,	0	1	6
Fourth mowing,	0	1	0
Raking, &c.	0	1	3
Fourth horse-hoeing	0	1	6
Third hand-hoeing,	0	2	6
Fifth mowing.	0	1	0
Fifth horse-hoeing,	0	1	6
Raking, &c.	0	1	0
	<hr/>		
	1	11	2
Rent, &c.	0	17	0
	<hr/>		
	2	8	2
	<hr/>		

## PRODUCE.

	Ton.	cwt.	lb.	£.	s.	d.
First cutting.	2	5	16	1	12	0
Second,	2	11	96	1	12	0
Third,	2	17	96	1	16	0
Fourth,	2	17	80	1	16	0
Fifth,	2	0	0	0	17	11
	<hr/>			<hr/>		
	12	12	64	7	13	11
Expences,				2	8	2
	<hr/>			<hr/>		
Profit.				5	5	9
Five horse-hoeings,				0	11	11½
	<hr/>			<hr/>		
Clear profit,				4	13	9½

## OBSERVATIONS.

This third year of the lucerne, the point is brought to bear: the product is very considerable, although not so immense as many writers have taught us to expect. I never tried the experiment directly; but I have little doubt, but that common clover will yield as great a weight at two mowings, as this lucerne has done at five. Clover wastes in making, to about a fourth: now, three tons of clover-hay are by no means an uncommon crop; the quality therefore of the lucerne is one circumstance that renders it so valu-

able, and its duration a yet more important one: notwithstanding clover sometimes equalling it in weight, yet in profit it certainly will not; 4*l.* 13*s.* 9*d.* per acre, will very rarely be reaped from clover *unmanured*. But another circumstance which is decisive, is this considerable profit being gained from a *grass* in the severest drought I ever remember. Clover this year was burnt up: natural grasses were naught: in such distress were all farmers that had large stocks of cattle, that many were sold for half the value: of what noble consequence in such a situation, would a few acres of this lucerne have been! How valuable in husbandry, to be able at all times to possess a crop, that in case of a drought is a succedaneum for all that is destroyed! Considering the extreme unfavourableness of the season, the above 4*l.* 13*s.* increases to a much greater sum: for food is ever valuable in proportion to the demand for it.

This uncommon quality of lucerne is owing to the immense length of the roots: Mr. Tull says, they are longer than those of any other vegetable in the creation: I have tried more than once to gain a root complete; but although I was at the expence of digging a large hole seven feet deep, around a root of lucerne only three years old, yet was there no appearance of an end to it, nor did the tapering of the root indicate its being but a little farther in the ground. Now if roots draw in nourishment from every part, how can lucerne ever be burnt up? Some writers tell us, that as soon as the roots reach the clay, the plants die, from too much moisture: the present experiment is an absolute contradiction of this assertion; for I am very clear, that the roots within the first year, had penetrated considerably deep in the clay, the gravelly loam which composes the soil of this field, is not 2 feet deep, then comes a thin stratum of stiffer loam; and then a very stiff white clay, with many small chalk stones in it, which continues to a general depth. With a borer one might probably find chalk under it. As the lucerne has got deep into this clay, I shall be attentive to its future growth, to see if any decline ensues that can be attributed to the moisture of the clay.

	Days.
The first cutting lasted 2 horses,	56
The second, ditto,	56
The third, ditto,	64
The fourth, ditto,	64
The fifth, ditto,	32
Total,	272

From

From the 20th of April (when a large plantation might be begun) to the end of November are 224 days, consequently an acre would so long maintain two horses, and 48 days over. This is a considerable produce.

But notwithstanding the favourable appearance of the culture of lucerne in this experiment, yet I am still of opinion, that common farmers will never come into the practice.

Profit the third year,	-	-	-	-	-	£.	s.	d.
							4	13 9½
Loss the first,	-	-	-	-	-	£.	s.	d.
						2	15	7½
Ditto the second,	-	-	-	-	-	0	1	5
								<hr/>
							2	17 0½
Profit in three years, or 12s. 2½d. per annum,	-	-	-	-	-		1	16 8½
								<hr/>

It is very evident, from this account, that one must look to future years for profit *upon the whole*; 12s. per annum in three being much inferior to common husbandry; and waiting three years for the whole, even of this small profit, would absolutely condemn the culture to the generality of husbandmen; but to those who can afford to wait for their profit, this circumstance is not an objection.

As to the price per cwt. of green lucerne, by feeding horses at 2s. a week, I have made many particular experiments on it; and find that upon an average it amounts to 7d. varying from 5d. to 9d. I was attentive to this circumstance not only in this but in other trials, as it is of consequence to be able to value crops when they are used in methods that do not determine it.

#### EXPERIMENT, N<sup>o</sup> 4.

Culture, expences and produce of ten-perches, field P, 1766.

##### CULTURE.

The continuation of the preceding trial. The 25th of April cut it for the first time, without any previous culture: it was not quite arrived at its full growth, but I thought it more advantageous to be early in the first crop than leave it till full grown. The weight of this cutting was 314lb, which I gave to two horses in the stable, and it lasted them three days and a half, which at 2s. per week is 2s. The day after this cutting I both horse and hand-hoed it thoroughly, ordering the labourer to strike with force into the rows with the corner of his hoe wherever he saw any weeds, to loosen the earth among the plants as well as to destroy the weeds.

The 30th of May cut it the second time; an exceeding fine thick luxuriant growth: this cutting weighed 447lb. and lasted two horses five days, which

which comes to 2s. 10d. This cutting I remarked was somewhat gritty from falling from the scythe into the spaces that were in such fine tillage ; but it was not to any great degree, nor enough to make the horses the least inclined to reject the food. The day after the cutting, horse-hoed the rows, but they did not require any hand-hoeing.

July 15th, cut it the third time : the weight 536lb. which lasted two horses five days, as before, which also comes to 2s. 10d. horse-hoed it after this cutting.

August 27th, cut it a fourth time : the weight 720lb. which is a very great produce. It lasted two horses six days and a half, which amounts to 3s. 10d. Horse-hoed as before, and hand weeded the rows.

October 30th, cut it for the fifth and last time : a full growth of 699lb. which lasted two horses six days, and is 3s. 5d. After this cutting, I ploughed about in each interval, both furrows to the plants, turning a ridge of earth directly upon the rows, and opening a large deep trench in the middle of each interval ; the piece then looked exactly like a field on the ridge, nothing of the rows to be seen. I did this for the sake of ploughing deeper than I should otherwise have been able to do ; and for letting the frost deep into the intervals ; so that by harrowing the land flat in the spring, the first dry time, the next year's young shoots would grow out of a fine bed of well pulverized earth.

## EXPENCES.

	£.	s.	d.
Five mowings,	0	5	10
Raking together, loading and carting,	0	7	6
Five horse-hoings,	0	7	6
Hand-hoeing once,	0	4	6
Hand weeding once,	0	2	6
	1	7	10
Rent, &c.	0	17	0
	2	4	10

## PRODUCE.

	Ton.	cwt.	lb.	£.	s.	d.
First cutting,	2	4	96	1	12	0
Second ditto,	3	3	96	2	5	4
Third ditto,	3	16	64	2	5	4
Fourth, ditto,	5	3	96	3	3	4
Fifth, ditto,	4	19	96	2	14	8
Total,	19	8	0	11	18	8

Expences,



# L U C E R N E.

135

	£.	s.	d.
Expences, - - - - -	2	4	10
Profit, - - - - -	9	13	10
Five horse-hocings, - - - - -	0	12	2½
Clear profit, - - - - -	9	1	7½

## OBSERVATIONS.

This profit is very considerable, and far beyond any thing that is reaped in common husbandry. It also makes ample amends for former deficiencies.

	£.	s.	d.
The profit of the end of the third year was - - - - -	1	16	8½
Ditto at the of the 4th year, - - - - -	9	1	7½
Total, - - - - -	10	18	4

Or, 2*l*, 14*s*. 7*d*. *per annum*.

This account shows, that the great importance of lucerne is its duration; and consequently no person who cultivates it should be disgusted with his loss at the end of the first or second year: since it is plain, that lucerne in the third year is not arrived nearly at perfection. Can any thing be a greater proof of this than the profit of the present year being above 9*l*. and that of the last only 36*s*. Whether the crop will increase next year, is a question of great importance, and will be decided by the next register.

Resepding the clay soil into which the roots of the lucerne had penterated: it is evident, from the vast increase of this year's crop, that this circumstance is of no detriment to the crop, which is very contrary to the predictions and assertions of many authors.

	Days.
The first crop kept two horses, - - - - -	56
The second, ditto, - - - - -	80
The third, ditto, - - - - -	80
The fourth, ditto, - - - - -	104
The fifth, ditto, - - - - -	96
Total, - - - - -	416

From



From the 20th of April, to the end of November,	- - -	324
Half this time,	- - -	112

So that this crop of lucerne maintains at the rate of 3 horses that time, and 30 days over ; which is the keeping a fourth horse near 3 months.

This is a vast produce, and shews the immense consequence of lucerne to such cultivators as can afford to give the necessary culture ; and wait at first some time before they are reimbursed. But another point, not of less importance, is the incessant tillage and cleaning, which must be given to lucerne : a common farmer, I am confident, would never be brought to horse and hand-hoe a field every six weeks in which he could not pluck up ten handfuls of weeds : he would never be brought to think it requisite, but would let the land alone till a formidable appearance *forced* him to some exertion ; but such a conduct would ruin lucerne, the consequence would be damaging the crops, and giving the weeds such an opportunity to get a head, that afterwards a great expence, would really be necessary to reduce them ; too great a one for a farmer who had acted on such principles, to think of sustaining.

But I am convinced, that this accurate and attentive culture, is the very soul of lucerne. If accidentally any part of the plantation happen to be neglected ; if the plough in horse-hoeing makes a balk, or flies out of the ground som touching on a stone ; if the labourers in hand-hoeing, are more careless in one place than in another : I will not assert that weeds, must inevitably be the result ; but in my land, I have generally found it so ; and universally experienced the mischief sustained by the lucerne from *any* weeds, however small the number. A plant which yields such immense returns, and is so often mown in perfection, must require all the nourishment the land can give ; and be damaged by weeds in proportion to the nourishments they extract.

#### EXPERIMENT N<sup>o</sup> 5.

Culture, expences, and produce of ten perches, field P. 1767.

#### CULTURE.

The continuation of N<sup>o</sup> 4. The 6th of March, I harrowed down the ridges thrown up the autum before, by crossing the rows three times. This management seemed to agree perfectly with the lucerne, for it presently showed itself very beautifully ; it was cut the first time the 29th of April, the product

product 335 lb. which lasted two horses four days, consequently amounts to 2s. 3d. the next day horse and hand hoed it.

June 5th, cut it the second time; produced 462 lb. which lasted two horses five days; the amount therefore 2s. 10d. Horse hoed it again, but it did not want hand hoeing.

July 14th, cut it the third time; a most capital and beautiful crop, quite thick, so that the intervals between the rows were hardly seen: the weight 725 lb. which lasted two horses just a week; the value 4s. Horse-hoed it after this cutting; hand hoeing not wanted.

The fourth cutting was taken the 4th of September, the weight 642 lb. which maintained two horses five days and a half; the value 3s. 2d. After this cutting, a tenant entered the land, and the field was sown with wheat, so that the experiment was decided much sooner than I wished it should.

EXPENCES.				£.	s.	d.
Harrowing,	-	-	-	0	0	5
Mowing four times,	-	-	-	0	4	0
Raking together, loading and carting,	-	-	-	0	6	0
Three horse hoeings,	-	-	-	0	4	6
Once hand-hoeing.	-	-	-	0	5	0
				<hr/>		
				0	19	11
Rent,	-	-	-	0	17	0
				<hr/>		
				1	16	11

PRODUCE.				£.	s.	d.
Ton. cwt. lb.						
First cutting,	-	-	2 9 8	1	16	0
Second ditto,	-	-	3 6 0	2	5	4
Third ditto,	-	-	5 5 0	3	4	0
Fourth ditto,	-	-	4 11 80	2	10	8
				<hr/>		
				9	10	0
				<hr/>		
Expences,	-	-	-	1	16	11
Profit,	-	-	-	7	19	1

	£.	s.	d.
Brought over,	7	19	1
Harrowing,	0	1	1½
Horse hoeing,	0	7	3½
	<hr/>		
	0	8	5½
Clear profit,	7	10	7½
	<hr/>		

## OBSERVATIONS.

The first remark to be made on this account, concerns the loss of a cutting: the fifth last year amounted to 2*l.* 14*s.* and there can be no doubt, from the general turn of this experiment, but this year's fifth would have at least equalled that of the preceding: this would have rendered the present year more profitable than the preceding. But if we take only what really was produced, the culture is proved to be uncommonly profitable. And what is of great moment, is there being no sign of decay, wearing out, or decline of profit; on the contrary, there is greater reason to suppose, that this year's product would have somewhat exceeded the last: from which we may gather, that the lucerne was but now arrived at full perfection: from the best accounts we have of it, it remains many years in perfection; and in all probability it would be a long time before it declined so much as to render it adviseable to plough it up. But these events would undoubtedly depend on the tillage and care bestowed upon it; for without the utmost attention of this sort, it would never be lasting.

This crop being sown in the spring of 1763, has lasted *five* years complete; and as I just remarked, these five have been a gradation of improving produce indubitably as far as the fourth, inclusive; and in all probability to the fifth: but I should observe, that the fifth, on this supposition, does not exceed the fourth in so great a degree as to give any reason to suppose the sixth would have exceeded the fifth: on the contrary, I imagine that this lucerne would have been at a stand, that it would have continued to yield an average profit of eight, or nine pounds an acre, till it began to decline; but when that would have been, no experiments ever published, can give us any grounds to decide.

	Days.
The first cutting this year maintained two horses	64
The second	80
	<hr/>
Carried over,	144
	<hr/>
	Brought

					139
Brought over,	-	-	-	-	Days.
The third	-	-	-	-	144
The fourth	-	-	-	-	112
					88
					<hr/> 344
From the 20th of April to the end of November,	-	-	-	-	224
Half this time,	-	-	-	-	112
					<hr/> 336

Hence we find this produce sufficient to keep three horses from the 20th of April, to the end of November; giving up the fifth cutting.

This product is very great, and such as I am confident no other grafs will ever arrive at. But I believe I have omitted to observe that my horses are all of the small Suffolk breed; very large horses, I apprehend, would eat a larger portion; but then it must be worth above 2s. a week to foil them.

#### GENERAL OBSERVATIONS ON EXPERIMENT N<sup>o</sup> 1, 2, 3, 4 and 5.

It is necessary to draw the register of this crop into one point of view, that we may be able to see all the particulars of expences, produce, profit, &c.

		1763.			
£. s. d.	Ton, cwt. lb.	£. s. d.	£. s. d.	£. s. d.	
Expences, 2 19 4½	Product, 0 6 0	Value, 0 3 9	Profit, 0 0 0	Loss, 2 15 7½	
		1764.			
Expences, 3 1 9	Product, 4 11 96	Value, 1 0 4	Profit, 0 0 0	Loss, 0 1 5	
		1765.			
Expences, 3 0 1½	Product, 12 12 64	Value, 7 13 11	Profit, 4 13 9½	Loss, 0 0 0	
		1766.			
Expences, 2 17 0½	Product, 19 8 0	Value, 11 18 8	Profit, 9 1 7½	Loss, 0 0 0	
		1767.			
Expences, 2 5 4½	Product, 15 11 83	Value, 9 16 0	Profit, 7 10 7½	Loss, 0 0 0	
14 3 7½	52 10 14	32 12 8	21 6 0½	2 17 0½	
			2 17 0½		
			18 9 0½		
Averages, 2 16 8½	— — 10 10 4	6 10 6½	3 13 9½		

I need not remark that had the fifth cutting of 1767 been taken, this state would have appeared differently: the last cutting in 1766 began to sprout but a week sooner, and amounted to 5 ton, value 2l. 14s. 8d. with that cutting the year 1767 would undoubtedly have equalled 1766; there was some reason to think it would exceed it, for the first, second, and third cuttings of 1767 beat those of 1766, nor did any one cutting of any year equal the best of 1767.



But not to insist further on this advantage, the extent of the above table proves lucerne to be a most valuable crop. In the first place, the expences are by no means immoderate; 2*l.* 16*s.* a year, rent included, for a crop that is, literally speaking, kept as clean as a garden, is cheap; and exceeded by most articles of culture of the expensive kind.

The product in quantity is very great, amounting the fourth and fifth year from 15 to 20 tons; a cutting lost. We may certainly call the average produce of this lucerne, when in perfection, 20 tons. This also much exceeds any other grass; and let the reader remember that we are not speaking of any high manured land, or a soil of great natural fertility; none of the crops have had the least manure. So vast a produce as 20 tons of green fodder, from one acre unmanured, must proceed from the lucerne drawing a great part of its nourishment from a greater depth than any former crop had penetrated; and how much soever the sowners of the under strata may be insisted on, and their unsuitness for promoting vegetation before they are well exposed to the atmosphere, yet the instance of lucerne gives no slight reason for supposing that all those plants whose roots have a power to shoot deep into such earth have also a power to extract nourishment from it. This trial is very far from offering the least reason to suspect the land in the fourth or fifth year on the decline in fertility; on the contrary, the products greatly increase; and one may suppose, without exaggeration, that the quantity would remain at about 20 tons for some years. The tillage that is bestowed on the crop must certainly be of vast utility; but not sufficient, in so narrow as two feet intervals, to support a vegetable that yields 20 tons of produce, if it did not root deeper than common crops.

The product in value is also very great; the average of the fourth and fifth years (one cutting lost) is above ten guineas *per* acre. This is a very considerable sum, and far beyond any thing in common husbandry: but it is necessary to give other calculations than that of 2*s.* a week for soiling horses in a stable; and the rather, as I am informed that in many parts of England the price is much higher joisted in a clover field; it rises in this country from 1*s.* 3*d.* to 2*s.* 6*d.* the latter uncommon, but 2*s.* a common price. Now from the little experience I have had of lucerne, I am confident that it far exceeds clover as a food for horses; keeping them in much finer order.

	£.	s.	d.
Product of the fourth year,	11	18	8
— of the fifth,	9	16	0
	21	14	8
	£.	s.	d.
3e at 2 <i>s.</i>	10	17	4
Ditto at 2 <i>s.</i> 6 <i>d.</i>	13	14	8
	Average		

	£.	s.	d.
Average at 3s.	16	6	0
Ditto at 3s. 6d.	19	0	4
Ditto at 4s.	21	14	8
Ditto at 4s. 6d.	24	9	0
Ditto at 5s.	27	3	4

This table will shew the produce of the preceding crops, at various rates ; the lowest makes lucerne an object of very great importance.

From 8l. to 10l. an acre profit is another point unequalled in common husbandry, and but little known, I believe, in the highest improvements. From 800l. to 1000l. a year *clear* profit on one hundred acres of lucerne is an object not unworthy the attention of country gentlemen. The space of land is small, and consequently the attention not great or divided. Those articles of culture are most proper for gentlemen which will yield a considerable profit from a small space of land. If 1000l. a year from common farming were the object, the attention must be as great as that of a common farmer, and arising even to slavery ; for it must be an aggregate of very numerous and small articles of profit, the result of oeconomy and prudence : whereas the case is extremely different with the management of only an hundred acres of lucerne, a constant crop, requiring no renovation.

#### EXPERIMENT N<sup>o</sup> 6.

Culture, expences, and produce of a rood field L\*, 1764.

#### CULTURE.

My failure in the culture of lucerne, in 1763, gave me a momentary determination never to have any thing more to do with it ; but a cooler consideration made me alter my opinion. I reflected on the causes of my ill success, and they appeared too clear to me totally to render the culture improper. I thought a better management would be attended with more success ; and especially as I had the rocks strong in my imagination that I split on before. With these ideas I made choice of a rood of land that had been well fallowed through the year 1763, in October of which year it was thrown on to the ridge for the following winter. These ridges were ploughed down in March ; two more earths were given in April, the last of which turned in six loads of rotten farm yard dung. This manuring I gave on account of the soil not being the same as Mr. Millar describes as proper ; so I added the dung to make amends for this circumstance : the same ploughing that turned it in left the land upon a level ; it was then harrowed, and the 5th of May I drilled it in equally distant rows two feet asunder, using 14lb. of seed. The plants arose very regularly and well.

## ARTIFICIAL GRASSES.

well. The 24th, hand hoed all the land thoroughly; the men did it by the day, that it might be carefully performed, and they picked out all the weeds that grew among the young lucerne. The 13th of June I gave it another hand-hoeing and weeding as before; the plants were very luxuriant, and left in fine order. July 12th, they were from eighteen inches to two feet high, and here and there a very strong one was in blossom. The produce of this cutting was 7 cwt. 46 lb. and being given to two of my cart horses, it lasted them six days. After the cutting I hand hoed the ground thoroughly, and weeded the rows at the same time. The great difference between this produce and that of my last year's trial, shewed that I was now in a much better road for cultivating lucerne with success than I had been before.

October 29th I cut it again; the produce 10 cwt. 72 lb. which lasted two horses eight days and an half. I then gave a fresh hand hoeing and weeding to the rows.

Horse hoeing I omitted this year, that the plough moving in so narrow a space might not damage any of the plants.

EXPENCES.						£.	s.	d.
Nine ploughings,	-	-	-	-	-	0	2	3
Four harrowings	-	-	-	-	-	0	0	2
Water furrowing,	-	-	-	-	-	0	0	4
Manuring,	-	-	-	-	-	0	9	0
Drilling,	-	-	-	-	-	0	0	2½
Seed,	-	-	-	-	-	0	1	6
First hand hoeing, &c.	-	-	-	-	-	0	2	0
Second ditto,	-	-	-	-	-	0	1	2
First mowing,	-	-	-	-	-	0	0	3
Raking together, carting, &c.	-	-	-	-	-	0	0	3
Hand hoeing,	-	-	-	-	-	0	1	0
Second mowing,	-	-	-	-	-	0	0	3
Raking together, &c.	-	-	-	-	-	0	0	3
Hand hoeing, &c.	-	-	-	-	-	0	1	6

Rent, &c.	-	-	-	-	-	1	0	7½
	-	-	-	-	-	0	8	6
	-	-	-	-	-	1	9	1½

## PRODUCE.

	Ton.	cwt.	lb.	£.	s.	d.
First cutting,	-	-	0 7 46	0	3	5
Second ditto,	-	-	0 10 72	0	4	10
	-	-		0	8	3

	£.	s.	d.
Expences,	1	9	1½
Produce,	0	8	3
Loss,	1	0	10½
	£.	s.	d.
Ploughing,	0	3	4½
Harrowing,	0	0	2½
Manuring,	0	2	4½
Drilling,	0	0	0½
Total loss	1	6	10

## OBSERVATIONS.

Lucerne must never be considered as a crop that is to pay expences the first year : that time, let the advantages be what they may, ought certainly to be esteemed its infancy. The produce is something, but scarcely an item of what it may be expected to arrive at. This rood was very well prepared for both in ploughing and manuring; but no power either of tillage or manure is sufficient to make this plant yield large crops the first season. The two cuttings keeping two horses fourteen days and a half is a month for one horse, or four months *per acre*.

EXPERIMENT, N<sup>o</sup> 7.

Culture, expences, and produce of a rood, field L\*, 1765.

## CULTURE.

The continuation of N<sup>o</sup> 6. March 20th, I hand hoed all the land, to clean it against the first cutting, which was the 27th of April, a full crop of 13 cwt. 26 lb. I gave it to two horses, and it lasted them twelve days. I horse hoed the rows after this cutting, turning a furrow *from* the plants, leaving them upon a narrow slip of earth, and throwing up an imperfect ridge of earth in the middle of each interval; then I hand hoed that slip and weeded the rows themselves.

June 8th, cut it the second time, produce 13 cwt. 87 lb. which kept two horses 11 days. Horse hoed the rows two days after the cutting, the contrary way to the last.

July 22d, cut it the third time; produce 14 cwt. 55 lb. which lasted the two horses twelve days. This time the horse hoeing left the rows on a slip, as at first, so that they were very handy to hoe and weed, which was accordingly executed. I apprehend hand hoeing and weeding to every other cutting.



ting will be sufficient; and if it should always be to that which is left by the horse hoeing in this manner; for when that operation throws the moulds to the plants, the intervals are so narrow, that the plants are half covered with little clods and loose moulds. This is no objection to the crop, for I have observed that the fresh lucerne rises never the worse for it, but it is a trouble in the hand hoeing and weeding, and should therefore be avoided.

August 31st, cut it again: it was not full grown, but as I had my eye on another cutting I chose to take this rather before its time. The produce 11 cwt. 42 lb. which lasted two horses ten days. Horse hoed the rows as before.

It was cut again the 2d of November the product of which was 11 cwt. 16 lb. which likewise lasted the two horses ten days. After this cutting I ploughed a bout in each interval, very deep, burying the rows of lucerne under a ridge of moulds, and leaving an open deep trench in the middle of each interval.

But here I must remark, that this young lucerne, in yielding the above products greatly amazed me, from the severe drought of the season. Throughout the summer all common grasses were quite burnt up; natural ones yielded nothing; and clover did not produce a fifth part of its usual crops: it is, therefore, a most singular effect, that lucerne in but its second year, should produce such considerable crops, and be mown at full growth without having received a single drop of rain.

## EXPENCES.

	£.	s.	d.
First hand hoeing,	0	1	4
First mowing,	0	0	3
Raking together, loading, and carting,	0	0	4½
First horse hoeing,	0	0	4½
Second hand hoeing,	0	0	7½
Second mowing,	0	0	3½
Raking together, &c.	0	0	4½
Second horse hoeing,	0	0	4½
Third mowing,	0	0	4
Raking together, &c.	0	0	4½
Third horse hoeing,	0	0	4½
Hand hoeing,	0	0	7½
Fourth mowing,	0	0	3½
Raking together, &c.	0	0	4½
Fourth horse hoeing,	0	0	4½
Fifth mowing,	0	0	3
Raking together, &c.	0	0	4½
Carried over,	0	7	4½
	Brought.		

						£.	s.	d.
Brought over,	-	-	-	-	-	0	7	4½
Fifth horse hoeing,	-	-	-	-	-	0	0	4½
						0	7	9
Rent, &c.	-	-	-	-	-	0	4	3
						0	12	0
PRODUCE.								
						£.	s.	d.
First cutting,	-	-	0	13	26	0	6	10
Second ditto,	-	-	0	13	87	0	6	3
Third ditto,	-	-	0	14	55	0	6	10
Fourth ditto,	-	-	0	11	42	0	5	8
Fifth ditto,	-	-	0	11	16	0	5	8
			3	4	2	1	11	3
	<i>per acre,</i>		12	16	8			
Expences,	-	-	-	-	-	0	12	0
Profit,	-	-	-	-	-	0	19	3
Five horse hoeings,	-	-	-	-	-	0	2	11½
Clear profit, 3l. 5s. 1d. <i>per acre,</i>	-	-	-	-	-	0	16	3½

## OBSERVATIONS.

From the information which I have received concerning lucerne, as well as from the assertion of authors, I understand that it is not near in perfection the second year ; which is not indeed peculiar to this grass, it is so with sainfoine ; but that it should yield so large a crop before it arrives at maturity, and in the driest year I remember is, I think, remarkable, and shews very strongly the great excellency of the plant. The ample dunging which it received the last year, no doubt, contributed largely to this effect ; and this has determined me to give it another good manuring early next spring, before I harrow down the ridges which I have thrown over the rows. It seems, from the great produce of lucerne, as if no crop would pay better for rich dressing.

	Days
The first cutting maintained in the proportion <i>per acre</i> of two horses,	48
The second ditto,	44
The third ditto,	48
The fourth ditto,	40
The fifth ditto,	40
Total,	220
VOL. II.	Suppose

Suppose the cutting for horses to begin the 20th of April ; from thence to the 2d of November are 196 days.

	Days.
The above lasted - - - - -	220
Deduct - - - - -	196
	<hr/>
Remains - - - - -	24
	<hr/>

So that this lucerne maintained at the rate of two horses *per* acre throughout the season and 24 days over, which in so dry a year is more than any three acres of the best grass in the country would do.

### EXPERIMENT N<sup>o</sup> 8.

Culture, expences, and produce of a rood, field L\*, 1766.

#### CULTURE.

Experiment N<sup>o</sup> 7. continued. The culture of this year began with manuring ; the first fortnight in March proved such uncommon fine weather that I took advantage of it to spread five loads of compost, consisting of equal parts of rotten hog and horse dung, coal ashes, and mortar rubbish, all town manure, that had been once mixed together ; then the ridges, thrown up the autumn before, were harrowed down, which partly buried the manure in the furrows. The effect of this conduct was such, that on the 14th of May I cut a full and luxuriant crop, which weighed 1 ton. 4 cwt. 2 lb. and lasted three horses 12 days. I then horse hoed the intervals *from* the rows, and hand hoed the rows themselves, plucking out the weeds that grew among the plants.

June 30th, cut it the second time, the weight 1 ton 12 cwt. 6 lb. which lasted three horses sixteen days. Horse hoed it as before. I have always had some trouble in cutting lucerne : my men have complained of the trouble of mowing it, but by degrees they got the art of cutting regular rows without much difficulty : it is a work of nicety rather than strength. The raking it up troubled me also for some time, by making the lucerne gritty ; but ordering them to use rakes that had much longer teeth than common, and not so near each other, to rake up but a small parcel at a time, and to lift the little heaps together, the evil was in a good measure remedied, though never absolutely, which was an inducement to try the use of the reap hook in one or two of my lucerne plantations, that I might know the additional expence. The difference, I believe, will not be great in a course of years.

August 20th, cut it the third time ; a very fine crop of 34 cwt. which maintained three horses eighteen days. Both horse and hand hoed directly after this cutting.

October 28th, cut another exceedingly luxuriant crop of 33 cwt. 22 lb. which lasted the horses as before; and then ridged up the land as last autumn, leaving the buried under a small ridge.

## EXPENCES.

	£.	s.	d.
Manuring, cost, and labour,	0	12	5
Harrowing,	0	0	1½
Mowing four times,	0	1	3
Raking together, loading, and carting four times,	0	1	9
Four horse hoeings,	0	1	6
Two hand hoeings,	0	3	0
	<hr/>		
	1	0	0½
Rent, &c.	0	4	3
	<hr/>		
	1	4	3½

## PRODUCE.

	Ton. cwt. lb.	£.	s.	d.
First cutting,	1 4 2	0	10	3
Second ditto,	1 12 6½	0	13	8
Third ditto,	1 14 0	0	15	5
Fourth ditto,	1 13 22	0	15	5
	<hr/>			
	6 3 85	2	14	1
Expences,		1	4	3½
	<hr/>			
Profit,		1	9	9½
		<hr/>		
		£.	s.	d.
Manuring,		0	15	10½
Harrowing,		0	0	3½
Horse hoeing,		0	2	5½
		<hr/>		
		0	18	6½
		<hr/>		
Clear profit, 2½ 4s. 11d. per acre,		0	11	2½

## OBSERVATIONS.

This year's result of this trial fully answered my expectations in one respect, and as much disappointed them in another. The product is immense; above 24 tons per acre is a quantity that exceeds every thing else of the grass kind; the value in money also, amounting to above ten pounds, is extremely considerable though not equal to what I have known, for these horses devoured the lucerne at an uncommon rate. But what I was greatly disappointed in was

the article of profit: 44s. upon 24 tons of lucerne is nothing; it ought certainly to have yielded five pounds clear profit. This great falling off is owing to the expence of manuring with purchased dung, which runs very high. It would have been wonderful had not this crop turned out very large, for it had received two very ample manurings. The next year I expect a very considerable profit, for the fertility of these manurings will be very strong in the earth, and no extraordinary expences to be deducted.

	Days.
The first cutting lasted three horses	12
The second,	16
The third,	18
The fourth,	18
Total,	64
Which is per acre,	256
Suppose the foiling season to last from the 16th of April to the 2d of November, it is	200
Remains,	56

So that this crop of lucerne maintained through the season at the rate of three horses *per* acre, and eight weeks over, which is certainly prodigious. I do not think the utmost power of culture can carry this crop, on such soils as mine, farther than keeping four horses 200 days.

#### EXPERIMENT, N<sup>o</sup> 9.

Culture, expences, and produce of a rood field L\*, 1767.

Experiment N<sup>o</sup> 8. continued. The culture of this season began as before with harrowing down the winter ridges; the lucerne grew very luxuriantly, infomuch that it was ready to cut by the 11th, when a full crop was weighed of 30 cwt. 16lb. I horse hoed the intervals, and hand hoed the rows directly. This cutting lasted three horses 16 days.

June 27th, cut it the second time, the weight 33 cwt. 82lb. I made this cutting into hay, I was not very fortunate in the weather, but it was not spoiled; when dry it weighed 6 cwt. 32lb. which is a great reduction from the green weight, but had the weather been finer, the waste would have been less. I gave this hay to some horses, cows and oxen, all of whom eat it with great greediness. The horse hoeing as usual was given after this cutting, but the rows did not require hand hoeing.

August

August 10th, cut it for the third time, the weight 32 cwt. 13 lb. which I gave to three horses, and it lasted them 18 days. The intervals were then horse hoed, and the rows hand hoed.

September the 14th, cut it the fourth time, the weight 29 cwt. 7 lb. which lasted the three horses 16 days. Horse hoed the rows, but they did not require hand hoeing. October 30th cut it the fifth time, produce 26 cwt. this weight lasted three horses 13 days. As I left the farm, I omitted any further tillage.

EXPENCES.						£.	s.	d.
Harrowing,	-	-	-	-	-	0	0	1½
Mowing five times,	-	-	-	-	-	0	1	6
Raking together, loading and carting,	-	-	-	-	-	0	1	10½
Four horse hoeings,	-	-	-	-	-	0	1	6
Two hand hoeings,	-	-	-	-	-	0	2	9
						<hr/>		
						0	7	9
Rent,	-	-	-	-	-	0	4	3
						<hr/>		
						0	12	0

PRODUCE.						£.	s.	d.
	Ton.	cwt.	lb.	-	-			
First cutting,	1	10	16	-	-	0	13	8
Second ditto,	1	13	82	-	-	0	15	5
Third ditto,	1	12	13	-	-	0	15	5
Fourth ditto,	1	9	71	-	-	0	13	8
Fifth ditto,	1	6	0	-	-	0	11	1
						<hr/>		
						7	11	70
						<hr/>		
Expences,	-	-	-	-	-	3	9	3
						<hr/>		
Profit,	-	-	-	-	-	2	17	3
						<hr/>		
						£.	s.	d.
Harrowing,	-	-	-	-	-	0	0	3½
Horse hoeing,	-	-	-	-	-	0	2	5½
						<hr/>		
						0	2	8½
						<hr/>		
Clear profit per acre, 10l. 18s. 1d.	-	-	-	-	-	2	14	6½

## OBSERVATIONS.

The effect of the rich manurings of former years, here appears clearly enough. The product is amazingly great; and the profit no less considerable. I know of no crop from which such great advantage is reaped, that requires so little trouble; for the lucerne cannot be ranked with meadows and pastures, fed with cattle, in the small degree of attention requisite to them, yet being a perennial crop, it spares the cultivator the round of various trouble demanded by annual ones. And as the culture bestowed on this noble grass is extremely similar every cutting and every year, it does not require that anxious attention which must be given to all sowings, &c. of annual crops. Any gentleman could better conduct the culture of 100 acres of lucerne, and with infinitely less probability of being cheated, than of 10 acres of corn.

	Days.
The first cutting of this crop maintained 3 horses	16
The second ditto,	18
The third ditto,	18
The fourth ditto,	16
The fifth ditto,	13
	<hr/> 81
	4
Or, <i>per acre</i> ,	324
The foiling season,	200
	<hr/>
Remains,	124
	<hr/>
These 124 days of three horses are of one,	372
The season,	200
	<hr/>
Remains,	172

Consequently this produce maintained at the rate of four horses 200 days; and a fifth 172 days. This is a greater produce than I should have conceived possible from one acre of land. Gentlemen who feed large coach horses will not find such a produce in *time of keeping*; because my horses are the small Suffolk ones, about 14½ hands high: but their profit will be the same as they must reckon a higher price *per week*.

In this experiment, I have reckoned the cutting made into hay, in the proportion of price as the others, having no rule to value the hay by; but I should observe, that lucerne seems much better adapted to feeding cattle with, *mown green* than to making into hay; for it has not the quality of natural



natural grass, of yielding good hay, notwithstanding some showers of rain; common hay is often very good that has received no slight quantity of rain, providing it was made in a judicious manner: in this respect lucerne resembles clover, which is much more damaged by rain in making; or tares, which in very fine weather makes the finest of hay for hard working horses, but with a small quantity of rain becomes worse than straw. Now I would not be understood to think, that lucerne is so totally spoiled with a little rain: I know the contrary by experience; but at the same time, it certainly will not bear the wet weather near so well as natural grass. This is no great objection to it; for the profit of it, in feeding horses, is so extremely great, that it would be extravagance to expect any thing further.

In the product of this season, the increase from 1766 is very great, which shews what vigour the plants enjoyed from the preceding manuring, I complained last year of the smallness of the profit owing to the expence of manuring, but the crops of this have amply repaid it. Reason must tell one, that a grass which is five times mown in full growth, in one season, must pay excellently for manure; and that it is very difficult to lay on too much.

#### GENERAL OBSERVATIONS ON EXPERIMENTS N<sup>o</sup> 6, 7, 8 and 9.

I shall collect the several particulars of this plantation into one view *per* acre, so that the general result may be the easier seen.

		1764.							
£. s. d.	Ton. cwt. lb.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Expences, 7 0 4	Product, 3 12 24	Value, 1 13 0	Profit, 0 0 0	Loss, 5 7 4					
		1765.							
Expences, 2 19 11	Product, 12 16 8	Value, 6 5 0	Profit, 3 5 1	Loss, 0 0 0					
		1766.							
Expences, 8 11 5	Product, 24 15 4	Value, 10 16 4	Profit, 2 4 11	Loss, 0 0 0					
		1767.							
Expences, 2 18 10	Product, 30 6 56	Value, 13 17 0	Profit, 10 18 1	Loss, 0 0 0					
21 10 6	71 9 92	32 11 4	16 8 1	5 7 4					
			5 7 4						
			11 0 9						
Averages, 5 7 7½	— — 17 17 51	— 8 2 4	2 15 2½						

This table abounds with several points of great importance for discovering decisively the nature and value of lucerne. The average profit upon the four first



first years, when the preparation is a fallow, and when two rich manurings are given, we find is but trifling: this evidently shews that lucerne should never be cultivated under the expectation of immediate payment; and that being a perennial crop, on account of the three or four first years, is the most disadvantageous light in which it can be viewed. Would to heaven I had it in my power to lay before the reader a register of twenty years! I feel the amazing profit which would then appear from lucerne.

Those who would form a true idea of the nature of this plant should consider the first years as *preparation*. In fallowing land for any crop, the farmer does not expect that each ploughing should repay the expence, but looks forward two years for a reimbursement: in the case of this grass, the first years of it, when much is spent on it and little received, it should be the same; and the expectation of profit removed, till it is of a certain age, and well fixed in fertility and cleanness. In this way of considering the crop, the following division of the above table is the properest idea of the case.

## PREPARATION.

	Expences.				Profit.				Loss		
	£.	s.	d.		£.	s.	d.		£.	s.	d.
1764,	7	0	4	-	0	0	0	-	5	7	4
1765,	2	19	11	-	3	5	1	-	0	0	0
1766,	8	11	5	-	2	4	11	-	0	0	0
	<hr/>				<hr/>				<hr/>		
	18	11	8		5	10	0		5	7	4
					5	7	4				
					<hr/>						
					0	2	8				
Average,	6	3	10		0	0	10				

## CROP.

1767,	2	18	10	-	10	18	1
-------	---	----	----	---	----	----	---

The year 1766, it is true, produces a vast quantity; but as it is manured very richly, the expences eat out the profit, and should consequently be considered as preparatory to the following years. The product of the three first years we find just pays the expence. After that year the annual profit would, beyond all doubt, continue very considerable. That of 1767 is a noble beginning, and an earnest of great future profit.

But

But here it should farther be remembered, that lucerne is not in perfection the fourth year.—I have already shewn that there is at least a great probability of the fifth year being superior to the fourth: this is a circumstance that gives us reason to suppose the regular permanent profit would not be inferior to this fourth year.

A profit of 10*l.* *per acre* gained from a perennial vegetable I will venture to assert exceeds any thing in husbandry, *for gentlemen*. Hops, madder, liquorice, potatoes, and some other crops, certainly exceed it, on some soils, in the amount of profit; but some of them are annuals and others last not above three years. Hops are, in particular, the most troublesome culture that is known in the world, sugar alone excepted. Now crops that last but a year generally require to be shifted from one field to another: if a man would have annually fifty acres of potatoes, he must farm, according to common management, 200 acres of land; and those which are renewed at the end of two or three years, are under the same predicament, *according to some writers*; besides the cultivator having a perpetual round of all that minute trouble which attends the renovation of such crops.

But with lucerne the case is very different; after it is once sowed it lasts many years; much longer, from the best accounts, than any modern experiments resolve. The attention it requires is very regular, and the operations to be performed on it remarkably similar; cutting as often as requisite, one horse hoeing after each cutting, and a hand hoeing when any weeds appear. No buying of seed, sowing, ploughing, harvesting, selling of corn, &c. &c. which render agriculture so troublesome to gentlemen. The product is open to no casualties; none of the misfortunes to which corn is liable; nor any of those evils that so regularly attend hay-making; but is all converted to the feeding of cattle, a business of the easiest kind.

If it be objected that the preceding experiments prove no more than the use of lucerne to horses, and that consequently a gentleman who undertook to cultivate it could extend his plantation no further than the quantity requisite for his horses. In answer to this I should observe, that any food which is a good one for horses is also good for most other sorts of cattle. It is idle to suppose that a food which will fat a horse will not agree with a working ox—or fat a heifer—or feed cows or sheep, &c. &c. Reason (were experiment wanting) would be sufficient to make known these truths. Let any gentleman, therefore, cultivate lucerne to an extent, it is evident enough that he can never want a market for its produce, as long as he has money to buy cattle with.

Now can any gentleman wish for a better employment of his time and money than to expend in three years (according to this experiment) 18*l.* *per acre* in preparing for lucerne, the whole of which expence to be repaid him within that time, with an after annual profit of 10*l.* *per acre*. Such accurate elegant husbandry is an amusement; and in respect of profit what more desirable

firable than to enjoy 1000*l.* a year from 100 acres of land! To speak of 10,000*l.* a year from 1000 acres would sound like a great exaggeration; but yet it is a mere matter of multiplication, indubitably possible, and even easy.

#### EXPERIMENT, N<sup>o</sup> 10.

Culture, expences, and produce of five square perches, field L\*, 1764.

#### CULTURE.

These perches I made choice of for trying lucerne in the utmost perfection of culture. They had been fallowed from autumn 1762, receiving six earths, and manured in September 1763, at the rate of twenty loads an acre of farm yard dung, being designed for wheat, but changing my mind, I threw it on to the ridge for winter. In March 1764, ploughed down the ridges; the first week in April stirred it again, and harrowed it; the 21<sup>st</sup>, another earth was given, and another harrowing. The last week ploughed it for the last time, and harrowed in five bushels of malt dust, and then drilled it in rows equally distant three feet, using in the proportion of 4*lb.* of seed *per* acre. The plants rose very favourably, and grew very fast; many young weeds came with them, but they were plucked out as fast as they appeared, and the intervals hand hoed thoroughly when the plants were six inches high.

June 24<sup>th</sup>, the rows were twenty inches high, a very fine thick crop, which weighed 150*lb.* which is in the proportion of 2 ton. 2 cwt. 96*lb.* *per* acre. After this cutting I hand hoed the intervals again, and weeded the rows perfectly clean; and as soon as these operations were over, I manured the rows with five pecks of foot, strewing it carefully upon them, and letting but little of it fall in the intervals. As the lucerne was very young I thought this way preferable to spreading it over the whole surface, as the roots were not probably long enough to draw the nourishment from such a distance. August 30<sup>th</sup>, I cut it a second time; the weight 201*lb.* or *per* acre 2 ton. 17 cwt. 47*lb.* After this cutting hand hoed the ground, and weeded the rows as before.

October 29<sup>th</sup>, cut it a third time, the weight 100*lb.* or *per* acre 1 ton. 8 cwt. 64*lb.* These three cuttings I thought were considerable for the first year of lucerne, which is a crop that is several years in coming to perfection.

I hand hoed the ground carefully after this cutting, and as soon as the few weeds were dead that were thus cut up, the whole surface with one load of rotten farm yard dung, which is at the rate of 32 *per* acre; a noble covering! As soon as this dung was spread, the rows were horse hoed with the common plough, which going a bout in each interval turned a furrow on each side from the rows, throwing up a handsome regular ridge in the middle of each interval, and burying under it all the dung except what was spread on the space occupied by the rows themselves, which were left on a slip of land about eight inches

inches broad. I made the plough go twice in each furrow, to deepen it, so that it was left full eight inches deep, and truly cut.

My motive for this management was to lodge the manure safely under the ridge to be ready very early in the spring to throw on each side to the rows, by splitting the ridge; and the furrows on each side the rows were made, that the winter frosts might get pretty deep into the earth, and pulverize that part well wherein the horizontal roots of the lucerne would run the succeeding summer. To a very tender plant these furrows should not be so deep; but so hardy a one as lucerne defies the frost. The proportions *per* acre are as follow.

EXPENCES.				£.	s.	d.
Eleven ploughings,	-	-	-	0	11	0
Five harrowings,	-	-	-	0	0	6
Manuring in 1763,	-	-	-	0	9	6
Ditto with malt dust,	-	-	-	2	17	4
4lb. of seed,	-	-	-	0	4	0
Drilling,	-	-	-	0	0	6
First hand hoeing and weeding,	-	-	-	0	10	6
First mowing,	-	-	-	0	0	10
Raking together, loading and carting,	-	-	-	0	1	0
Second hand hoeing and weeding,	-	-	-	0	6	9
Manuring with foot,	-	-	-	0	16	5
Second mowing,	-	-	-	0	0	10
Raking together, loading and carting,	-	-	-	0	1	0
Third hand hoeing and weeding,	-	-	-	0	5	0
Third mowing,	-	-	-	0	0	10
Raking together, &c.	-	-	-	0	1	0
Fourth hand hoeing,	-	-	-	0	4	0
Manuring,	-	-	-	0	16	3
Horse hoeing,	-	-	-	0	2	0
				7	9	3
Rent, &c.	-	-	-	1	14	0
				9	3	3

PRODUCE.				£.	s.	d.
		Ton.	cwt. lb.			
First cutting,	-	-	2 2 96			
Second ditto,	-	-	2 17 47			
Third ditto,	-	-	1 8 64			
				6	8	95
				at 7d. per cwt. 3 15 2		

	£.	s.	d.
Expences,	9	3	3
Produce,	3	15	2
Loss,	5	8	1
	£.	s.	d.
Ploughing,	0	16	6
Harrowing,	0	0	11½
Manuring,	0	8	4
Drilling,	0	0	2½
Manuring,	0	10	5½
Ditto,	0	2	9½
Last manuring,	0	12	0
Horse hoeing,	0	0	8
		2	11 11
Total loss,	8	0	0

## OBSERVATIONS.

When the produce of experiments are so small that one cannot feed a horse with it so as to draw accurate conclusions from it, the only way is to charge the value of it, which, in the present case, I have found, from repeated trials, to be 7d. *per* cwt. in the proportion of a horse at 2s. *per* week.

The loss by this trial is very heavy—this is clearly owing to the expence of manuring. Four different manurings to one crop must inevitably be a most heavy burthen in respect of charges; but the grand question is the product's repaying such expences with profit in succeeding years. This will be determined by the following trials; but I should remark, that as this experiment is sketched purposely to see how far lucerne will pay for a perfect culture, the future expence will be very high, as well as that of the present year; so that the product must be very great to be profitable.

Upwards of six tons of green fodder from an acre of lucerne is a very extraordinary produce for the first year. This plant is quite in its infancy for a year, and at least one or two more before it comes to perfection; so that the produce of it, in its early time, is no mark for a general judgement.

As to the soil, that of this field is very different from what Mr. Millar describes in his Gardener's Dictionary; it is a very moist loam upon a white clay. Now I apprehend that extreme rich manuring will, upon such land, be more beneficial than upon hot gravels; for certainly a great quantity of manure will convert it into a fine black garden mould; and, from the idea I have of lucerne, that is the soil which it most requires.

To all gentlemen who would have some profit from the small quantity of land they may chuse to keep in their hands; it is of importance to know



know what culture of lucerne is most beneficial. Suppose one to have annually at command one hundred loads of rotten dung, or other good manure, how many acres of lucerne should be proportion to that quantity, to be paid in the best manner for it? This is a point of no slight consequence; and it will receive some light from the event of the present trial.

EXPERIMENT, N<sup>o</sup> II.

Culture, expences, and produce of five square perches, Field L\*. 1765.

## CULTURE.

Continuation of N<sup>o</sup> 10. The first attention which this lucerne required in 1765, was to harrow down the ridges which were thrown up the autumn before: the plants shot out with great luxuriance; the second week in April, I hand hoed the whole surface and weeded the rows of young lucerne. The 17<sup>th</sup> of May, it was a full crop, 2 feet high; I cut it, and the weight was 342lb. or *per* acre, 4 ton, 17 cwt. 80lb. After this cutting, I hoed the rows, turning a furrow *from* them, forming a ridge in the middle of each interval: and then hand hoed the rows, and plucked out the weeds from among the plants. June 13<sup>th</sup>, it was fit to cut again, the growth being, to the astonishment of all who saw it, for the dryness of the weather was extremely unfavourable to the growth of all grasses, it being the 14<sup>th</sup> before any rain fell after a severe drought. The weight of this cutting amounted to 362lb. or *per* acre 4 ton, 19 cwt. 26lb. I horse and hand hoed as before.

In the operation of horse hoeing, I found these intervals incomparably better than the two feet ones, in enabling the ploughman to cut a deep and true furrow.

July 24<sup>th</sup>, cut it the third time, the weight 316lb. or *per* acre, 3 ton, 4 cwt. 92lb. This produce is certainly very extraordinary, considering that from its first week; no rain had fallen, and all kinds of grasses, except lucerne were burnt up, and starved all sorts of cattle. After this cutting, horse and hand hoed as before, the latter operation was not requisite, on account of weeds, but I gave it to keep the soil in as fine a state of pulverization as possible.

August 31<sup>st</sup>, cut it the fourth time, the produce 336 lb. or *per* acre 4 ton, 16 cwt. An immense quantity, considering the continuance of the drought: I horse hoed the rows after this cutting; and also hand hoed them.

October 26<sup>th</sup>, cut it the last time, the produce 224 lb. or *per* acre, 3 tons, 4 cwt. horse hoed as before; and being in course to be *from* the plants, the rows were left on a narrow slip of earth; the plants were so very thick, and the branches so luxuriant, that I thought a slight thinning would be of use, with

with this idea, I set a man to work with an instrument I had made out of a carpenter's old adz; it was in fact a thick curved hoe, 4 inches wide: with this hoe the man struck into the rows at the distance of every eight inches, and cut a gap 4 inches wide, pretty deep in the ground; the stroke, assisted with a grasping pull, brought out a solid piece of earth, full of roots and the head of some plants: after this operation, another horse hoeing was given, contrary to the last, in such a wide manner, as to throw moulds enough into the rows to fill up the gaps made by the last operation. This I thought was necessary to refresh the roots of those plants that shot into the gaps made by thinning. In this manner, the plantation was left for winter.

## EXPENCES.

	£.	s.	d.
Harrowing the ridges,	0	0	1½
First hand hoeing,	0	6	0
Cutting five times,	0	5	0
Six horse hoeings,	0	6	0
Second hand hoeing,	0	3	6
Third ditto,	0	2	6
Fourth and fifth ditto,	0	4	0
Thinning the rows,	0	12	0
Raking together, loading and carting,	0	7	6
	2	6	7½
Rent, &c.	0	17	0
	3	3	7½

## PRODUCE.

	Ton.	cwt.	lb.	£.	s.	d.
First cutting,	4	17	80			
Second,	4	19	26			
Third,	3	4	92			
Fourth,	4	16	0			
Fifth,	3	4	0			
	21	1	86			
Expences,			at 7d. per cwt.	12	5	0
Profit,				3	3	7½
				9	1	4½
				£.	s.	d.
Horse hoeing,				0	9	7½
Harrowing,				0	0	4½
				0	10	0
Clear profit,				8	11	4½

## OBSERVATIONS.

This trial shews, that lucerne when so very richly manured, as this was the first year, yeilds a vast produce the second, which I apprehend is not common: 21 tons are a great weight of fodder to come the second year from one acre; and the clear profit of 8*l.* 11*s.* 4*d.* a very considerable return, amounting to the total of loss, the first year, which I think is more than there was reason to expect. I did not manure it this year, as it was so amply done the first, and thought it better to let the horse and hand hoeings of this season incorporate it well with the soil before more was added. It yet depends on future years to decide what *profit* will result from this elaborate culture. The amount of some of these cuttings is, in one respect, particularly remarkable; the yielding such a weight in the midst of a burning drought, proves this plant depends not on the seasons, like clover and most other sorts.

EXPERIMENT N<sup>o</sup> 12.

Culture, expences, and produce of five perches, field L\*, 1766.

## CULTURE.

The continuation of N<sup>o</sup> 11. The beginning of March being a remarkable fine season, I took the opportunity of manuring these perches with 25 bushels of rotten farm yard dung, being 20 loads *per* acre; and left it spread over the land, ready to turn in by the first horse hoeing. It was a fine crop for cutting the 29th of April; the weight 350lb. or *per* acre 5 tons. Gave it the first horse hoeing after this cutting, turning a deep furrow from the plants, and burying most of the dung under a ridge of moulds in the center of the intervals. I did not perceive any deficiency of plants or herbage from the thinning given to the rows last autumn, the crop being quite thick and luxuriant; in all probability therefore it profited by that operation. The second growth came on with great speed, and branched out in a surprising manner, insomuch that the rows thickly joined in many places; cut it the 3d of June, the weight 455lb. which is *per* acre the considerable produce of 6 tons, 10 cwt. Hand hoed the rows, and hand weeded them at the same time, after this cutting; and then gave the second horse hoeing counter to the last. The third cutting was on 7th of July, the weight of which amounted to 420 lb. or *per* acre 6 tons. I was somewhat surprized at the inferiority of this cutting to the rest. Horse hoed again after it; cut it the fourth time, August the 20th, the weight 385lb. or *per* acre 5½ tons; gave another horse hoeing. The fifth cutting was October 14th, the weight 280lb,



or *per* acre 4 tons ; after which I hand hoed and weeded it, and also gave it another horse hoeing.

EXPENCES.				£.	s.	d.
Hand hoeing and weeding twice,	-	-	-	0	8	0
Manuring,	-	-	-	0	6	9
Cutting five times,	-	-	-	0	6	0
Raking together, loading and carting,	-	-	-	0	7	6
Five horse hoeings,	-	-	-	0	5	0
				1	13	3
Rent, &c.	-	-	-	0	17	0
				2	10	3

PRODUCE.				£.	s.	d.
	TON.	cwt.	lb.			
First cutting,	-	-	-	5	0	0
Second ditto,	-	-	-	6	10	0
Third ditto,	-	-	-	6	0	0
Fourth ditto,	-	-	-	5	10	0
Fifth ditto,	-	-	-	4	0	0
				27	0	0
				at 7d. per cwt.		
Expences,	-	-	-	15	15	0
				2	10	3
Profit,	-	-	-	13	4	9
				£.	s.	d.
Manuring,	-	-	-	0	12	6
Horse hoeing,	-	-	-	0	8	1½
				1	0	7½
Clear profit,	-	-	-	12	4	1½

## OBSERVATIONS.

This account deserves attention ; for the clear profit of 12*l.* *per* acre the third year, is much more considerable than could be expected, notwithstanding the loss of the former years being balanced by the product of the second. It evidently appears that this expensive culture answers ; for the expenditure of 8*l.* in loss, on the account of the two first years, to bring a return of 12*l.* profit the third, and the attendant chance of future crops, which here exists, is certainly laying out the money to uncommon advantage. This will appear very plain, if it be considered that the present crop pays the expense

pence of a manuring.—The product of 27 tons of green lucerne *per* acre appears to me to be very great; and from the extreme luxuriance of the crop, I have no great hope of carrying it higher: but future trials can alone decide that. The accounts of 40 tons *per* acre, met with in some French authors, seem to contradict the opinion; but their land must be much better than it is possible to make mine, if it ever yielded such a product.

### EXPERIMENT N<sup>o</sup> 13.

Culture, expences, and produce of five perches, field L\*, 1767.

#### CULTURE.

N<sup>o</sup> 12. continued. This year I manured the lucerne again, with 25 bushels of rotten farm yard dung, as before; but carried it on to the land earlier; viz. the 8th of January, in a hard frost: much snow following, gave me hopes that the virtue of the dung would, on a thaw, be washed into the ground. The lucerne was early in the spring, but not ready to cut till the 5th of May, when the weight amounted to 455 lb. or *per* acre 6½ tons. Hand hoed the rows, and weeded the plants after this cutting; and then gave the first horse hoeing; the soil in most admirable order—of a blacker hue than any land on my farm, owing to tillage and manuring. The second crop was ready for cutting the 4th of June, that is within the month, which is a surprizing vegetation; the weight the same as before. Horse hoed it again after this cutting. July 16th, cut it the third time; the weight 490 lb. or *per* acre 7 tons; horse hoed it again, and also hand weeded the rows. August 31st, cut it the fourth time; the weight 385 lb. or 5½ tons *per* acre; gave another horse hoeing after this cutting. The 3d of October, cut it for the last time; produce 315 lb. or 4½ tons *per* acre.

#### EXPENCES.

	£.	s.	d.
Manuring,	0	6	9
Cutting five times,	0	7	0
Raking together, &c.	0	7	6
Five horse hoeings,	0	5	0
Hand hoeing and weeding once,	0	2	6
Weeding once,	0	1	9
	1	10	6
Rent,	0	17	0
	2	7	6

#### PRODUCE.

				PRODUCE.					
				Ton. cwt. lb.			£. s. d.		
First cutting,	-	-	-	6	10	0			
Second ditto,	-	-	-	6	10	0			
Third ditto,	-	-	-	7	0	0			
Fourth ditto,	-	-	-	5	10	0			
Fifth ditto,	-	-	-	4	10	0			
				<hr/>					
				30	0	0	at 7d. per cwt.	17	10 0
Expences,	-	-	-	-	-	-	-	2	7 6
							<hr/>		
Profit,	-	-	-	-	-	-	-	15	2 6
							£. s. d.		
Manuring,	-	-	-	-	-	-	0	12	6
Horse hoeing,	-	-	-	-	-	-	0	8	1½
							<hr/>		
Clear profit,	-	-	-	-	-	-	-	14	1 10½
							<hr/>		

## OBSERVATIONS.

As I am unable to give the further register of this trial (which I much regret) I can only observe, that the increase of product from 1766 to this year is considerable; a point, relative to the culture in general, of much consequence, for it is from thence evident that the crop was not arrived at perfection; and although the increase, from this year to the next, might not be equal, yet it is extremely probable, from the nature of the plant, which is several years before it is at its full growth, and also from the increasing fertility of the land. An annual manuring of twenty loads an acre would undoubtedly increase the fertility of the soil in an amazing degree, and consequently increase the product of a plant that has such a power of feeding in a wonderful manner: for I apprehend no crop would bear a nearer proportion to the manure bestowed on it than lucerne. For these reasons I have not a doubt but the crops of this piece of land, had the culture been continued, would have proved of increasing value.

Fourteen pounds an acre clear profit are a prodigious sum from a crop that is of so little trouble, and so little expensive as lucerne. The attention it requires is not comparable to most other very profitable articles of culture: the manuring, horse hoeing, and hand hoeing are regular operations, and not at all difficult or complex. It appears to be an object peculiarly adapted to gentlemen farmers.

GENERAL OBSERVATIONS ON EXPERIMENTS N<sup>o</sup> 10, 11, 12 and 13.

It is to be remembered, that the soil of this field being naturally poor, is not the sort recommended by most writers. However some may insist on the necessity of very *dry* land, yet all require that which is *rich*: those, therefore, who have formed their ideas of the lucerne culture from such writers, should not recur to these experiments as possessing *all* advantages. I am very sensible there are many soils that would, with equal advantages, yield much larger products than this—at least such is my opinion: those who have tried them are, however, the only persons that can decide this point. I shall proceed to sum up all the circumstances of these trials into one view.

				1764.															
£.	s.	d.	Ton, cwt. lb.	£.	s.	d.	£.	s.	d.	£.	s.	d.	£.	s.	d.				
Expences,	11	15	2	Product,	6	8	95	Value,	3	15	2	Profit,	0	0	0	Loss,	8	0	0
				1765.															
Expences,	3	13	7½	Product,	21	1	86	Value,	12	5	0	Profit,	8	11	4½	Loss,	0	0	0
				1766.															
Expences,	3	10	10½	Product,	27	0	0	Value,	15	15	0	Profit,	12	4	1½	Loss,	0	0	0
				1767.															
Expences;	3	8	1½	Product,	30	0	0	Value,	17	10	0	Profit,	14	1	10½	Loss,	0	0	0
	22	7	9½		84	10	69		49	5	2		34	17	4½		8	0	0
													8	0	0				
													26	17	4½				
Averages,	5	11	11½		21	2	73		12	6	3½		6	14	4				

The very great advantages of this expensive and accurate culture of lucerne are here sufficiently evident. The soil is under a continual increase of fertility, is kept constantly in the most garden-like order, and yields a profit, on the average of the first four years, of 6*l.* 14*s.* 4*d.* *per* acre; if this is not sufficient to prove the real necessity of giving lucerne all possible advantages, if we would carry its produce to the highest pitch, nothing can. But the benefit of this method does not fully appear from such a general view; for, as I remarked in another place, the first years should be esteemed the preparation: the expence at which the following advantages are gained; the account, in that view would stand thus:

PREPARATION.				£.	s.	d.
1763 and 1764, loss,	-	-	-	8	0	0
X 2						
				CROP.		

	CROP.	£.	s.	d.
1765, profit,	- - - - -	8	11	4½
1766, ditto,	- - - - -	12	4	1½
1767, ditto,	- - - - -	14	1	10½
		34	17	4½
Average,	- - - - -	11	12	5½

Hence we find that the expence of *8l. per acre*, brings a succeeding profit of above eleven guineas *per acre per annum*, and that including the second year, which has appeared in a variety of experiments to be much inferior to the following years; but if the vast advantage of the lands receiving a rich manuring *every year* be considered, it will certainly strike the reader that there is the greatest probability of the crops continually increasing in value, at least for many years; but the duration of lucerne being a point hitherto totally unknown, (I mean a whole crop well cultivated) we cannot expatiate on it, nor is it of consequence whether the duration be fixed at twenty or at forty years; the profit in either case will be found immense.

Eleven guineas an acre clear from land that is continually improving, to a degree that could not fail in a few years of rendering it as rich as the most fertile garden, gained from a perennial crop, much less complex than that of any sort of corn or pulse, not expensive, and very little depending on the seasons: such a profit, under such circumstances, I repeat as an object of the highest importance, never equalled by common husbandry, and scarcely to be exceeded by the most complex trouble as well as expence taken into the account. Upon the whole, I shall venture particularly to recommend this perfect culture as much more profitable than inferior modes; all the extra expences repaid with very great profit. The costly preparation is highly advisable; for rich manuring attended with much tillage, makes all seeds of weeds vegetate, and destroys the plants, so that the expence of hoeing is reduced, and the annual manuring is evidently repaid with ample interest in the crop. I apprehend the distance of these rows, *viz.* three feet, to be as advantageous as any that can be devised, for it admits the horsehoeing in perfection, and at the same time no land is lost, at least if we may judge by the luxuriance of the crop, and the rows every where joining. Respecting culture, the horse hoeing after every cutting appears to be attended with much advantage; I should by all means recommend it, the soil is thereby kept in excellent order, in deep tillage, and the manure most excellently mixed with it. Handhoeings, in these experiments, were given according to necessity, which should in general be the rule for them when the soil, nearer the rows than the plough goes in horse hoeing, is at all hard or bound; or when any weeds appear among the plants, then hoeing and weeding should be done:

not



not a weed was ever to be seen in these trials, unless just before a hoeing. If a firm resolution be not taken to extirpate those enemies, it is in vain to expect great profits by lucerne; a shilling cannot be saved in cleaning without the loss of a guinea in product. These horse and hand hoeings have been objected to on account of the lucerne falling in the cutting on dust, and so licking it up and spoiling; if cut in the dew it may happen, but I never found any inconvenience from this circumstance worth speaking of: that the objection may have weight I grant, but it is so extremely small as to make no figure in the scale. If weeds enough are left to form a bed or carpet for the new mown lucerne, the crop must be in a rare condition: I do not think even reaping is necessary, (tho' I practice it with my transplanted crops) but if it is, the expence at any height ought to be submitted to, rather than allow a weed to appear.

The valuation of these crops is formed from the price of *7d. per cwt.* for green lucerne applied to keeping horses in the stable; which value I have found to be the average of many experiments on feeding various ones; it is the medium of several prices, from *5½d.* to *9¼d. per cwt.* I have applied lucerne in large quantities to feeding cows, oxen and young cattle; for which purposes it is at least as profitable as horses, but not having minuted the result with equal attention, I use that valuation. Thirty tons of lucerne, the product of the last year of this experiment, amounting in value to *17l. 10s.* at the rate of *2s. per horse per week*, are in the proportion of six horses kept seven months by each acre, or from April to October inclusive, which is a surprising product, and shews, if any thing can, that no man should think of keeping horses in summer on any other food: in what other application can an acre of land be made to keep six horses during seven months? I have often remarked, however, that my horses are of the little Suffolk breed, an excellent breed for strength and drawing, but small, consequently the quantity eat by them *per diem* must be less than by other horses of a larger breed. The average product in money of the three last years is *15l. 3s. 4d.* now supposing (which however is undoubtedly much below the truth) that sum to be the standing produce, the proportion is five horses kept the same time. Twenty horses kept on four acres of land! what prodigious quantities of pasture might be turned to the feeding more profitable cattle!

#### EXPERIMENT, N<sup>o</sup> 14.

Culture, expences and produce of two acres, field T, 1765.

#### CULTURE.

This piece yielded drilled and horse heed beans double rows on five feet ridges, in the year 1764; the autumn of which year, the ridges were reversed, and being water furrowed, were so left for winter. The beginning of

of April 1765: reversed the ridges by the first spring ploughing; and the middle of the same month spread 40 loads of rotten dung, and arched them up. The 29th harrowed them fine; and the next day drilled them with lucerne three rows on each, 1 foot asunder; the intervals, consequently, three feet wide.

The plants rose very freely, inasmuch that the rows were distinct enough to be hand weeded in May, and would have been higher, had the season been more favourable. The growth was not much the beginning of June, for it was quite a drought; but a fine day's rain falling the 14th, refreshed the young lucerne so much, that it shot up considerably. The latter end of the month I horse hoed the beds, by turning a furrow *from* the rows, and throwing up a small ridge in the middle of each interval; I then hand hoed the rows with six-inch rows, and plucked out the few weeds that had arose among the plants. After the 14th of June, we had another very severe drought till the 13th of August, not a shower falling in those two months; this lucerne suffered much from it, for I expected to be able to cut a full crop by the beginning of August; but had not that rain came the 13th, it would have been the end of the summer before half a crop was ready; however, it showed a fresh vigour after, but it was not ready to cut till the 11th of September; when I began it, and the produce was 3 tons, 16 cwt. as I found by weighing several square perches in different parts of it. I confined five heads of young cattle and three cows to it in a yard, and also two horses in a stable, and fed them with it as long as it lasted, which was three weeks and three days.

	£.	s.	d.
Two horses at 2s.	0	13	9
Three cows at 2s.	1	3	0
Five young cattle at 1s.	0	17	0
	2	13	9

Or 8½d. per cwt.

After the cutting, I horse hoed it again, leaving the ridges in their first form, and also hand hoed the rows.

	EXPENCES.	£.	s.	d.
Three ploughings,	-	0	6	0
Three harrowings,	-	0	0	9
Water furrowing,	-	0	1	0
Manuring,	-	0	18	10

Carried over 1 6 7

	£.	s.	d.
Brought over,	1	6	7
Drilling,	0	0	9
Seed, 13lb. at 1s. 2d.	0	15	2
Hand weeding,	0	8	0
Two horse hoeings,	0	2	8
Hand hoeing, &c.	0	12	0
Cutting,	0	2	0
Raking together, carting and loading,	0	3	0
	<hr/>		
Rent, &c.	3	10	2
	1	14	0
	<hr/>		
	5	4	3
PRODUCE.			
Feeding cattle,	2	13	9
	<hr/>		
Loss,	2	10	5
	<hr/>		
	£.	s.	d.
Ploughing,	0	11	7
Harrowing,	0	2	3
Manuring,	1	0	0
Drilling,	0	0	6
Horse hoeing,	0	4	0
	<hr/>		
	1	18	4
	<hr/>		
Total loss, or 2l. 4s. 4½d. per acre.	4	8	9

## OBSERVATIONS.

Lucerne should never be expected to pay the expences the first year; for notwithstanding the amazing vigour of its growth afterwards; yet is it as weak and delicate the first season as any plant I know: the product would have been more considerable, had not the season been so favourable; but the drought stopped its growth, and made the return amount but to a small weight for two acres of land. The writers on husbandry argue very strenuously, the length of the roots of lucerne, as a proof that it will support extreme dry weather better than any other crop; and I have this year found the assertion to be strictly true, with crops not sown within the same, but new sown ones have not struck their roots deep enough to verify the fact. How these treble rows will turn out, experience must tell; but they seem to me more promising of success than equally distant ones of 2 feet, which are recommended by Mr. Millar; for the intervals being 3 feet wide, give a much freer room for horse hoeing, and the spaces between the rows admit the hand hoe, as well as wider, ones; but another circumstance which appears



appears to me of importance, is the land supporting a greater number of rows; if these were equally distant they would be 20 inches asunder; a point, when it coincides with better horse hoeing, that seems decisive.

### EXPERIMENT N<sup>o</sup> 15.

Culture, expences, and produce of two acres, field, T, 1766.

#### CULTURE.

The continuation of N<sup>o</sup> 14. The second week in March, I horse hoed the rows, by turning a furrow from them on each side, and consequently throwing up a ridge in the middle of each interval: the young lucerne flower flourished very much throughout the month, and also through that of April. It was ready to cut the last week; when I began it, and continued cutting till the 10th of May. The weight *per* acre, I found from several square perches to be 19 cwt. or 1 ton. 18 cwt. the two acres which kept 5 horses a fortnight; the value 1*l*. As soon as the cutting was finished, I horse hoed for the second time, and also hand hoed the rows, and weeded them at the same time. It was not a full crop again till the 16th of June, when I cut the whole, and weighing as before, found the produce to be 26 cwt. *per* acre. This cutting I made into hay, and had, respecting weather, tolerable luck, the weight of the hay was 12 cwt. which may be valued at 2*s*. 6*d*. *per* cwt. or, 1*l*. 10*s*. from which it appears to be more profitable to use it green than to make hay of it; for 52 cwt. at 7*d*. equals the above produce without the expence of hay making; and feeding horses at 2*s*. a week, and other cattle proportioned, is a vastly surer market than hay at 2*s* 6*d*. *per* cwt. As soon as the hay was off the land, I horse hoed again; this operation I would observe, ought to follow the cutting immediately, as well as the hand hoeing; for then the spaces are quite clear, and no damage is done: an argument against making hay of lucerne; for in bad seasons, that would delay the work, so long as to prevent its being done at all.

July 26th, &c. cut it the third time, the weight 29 cwt. *per* acre, this cutting was given promiscuously to horses, cows and young cattle, and no account kept of it, an error, but excusable in the midst of such a perpetual round of experiments as I had constantly on my hands, I must therefore value it at 7*d*. *per* cwt. or 1*l*. 13*s*. 10*d*. for the two acres: horse hoed the ridges again after this cutting, and hand hoed the rows. The 30th of August was the fourth cutting; the weight 46 cwt. *per* acre. The two lasted four horses, three cows and six head of young cattle a fortnight, which comes to 2*l*. and is not more than 5*d*. an cwt. Horse hoed again, but the rows did not want hand hoeing. Cut it for the last time October 14th, &c. the produce, not a full crop, weighed only 24 cwt. *per* acre; lasted six horses a fortnight, or just

just 6*d.* an cwt. After this cutting I manured the whole with forty loads of farm yard compost, and then horse hoed it, and after that struck the furrows with the common Suffolk double mould board plough.

EXPENCES.

	£.	s.	d.
Water furrowing,	0	1	0
Seven horse hoeings,	0	9	4
Five cuttings,	0	10	0
Raking together, loading and carting four times,	0	12	0
Making, &c. hay,	0	4	9
Three hand hoeings,	1	0	0
	<hr/>		
	2	17	1
Rent, &c.	1	14	0
	<hr/>		
	4	11	1

PRODUCE.

	Ton.	cwt.	lb.	£.	s.	d.
First cutting,	1	18	0	1	0	0
Second ditto,	2	12	0	1	10	0
Third ditto,	2	18	0	1	13	10
Fourth ditto,	4	12	0	2	0	0
Fifth ditto,	2	8	0	1	4	0
	<hr/>			<hr/>		
	14	8	0	7	7	10
Expences,				4	11	1
				<hr/>		
Profit,				2	16	9
				<hr/>		
				£.	s.	d.
Horse hoeing,				0	14	0
Carting hay,				0	1	8
				<hr/>		
				0	15	8
				<hr/>		
Clear profit, 1 <i>l.</i> 0 <i>s.</i> 6½ <i>d.</i> per acre,				2	1	1
				<hr/>		

OBSERVATIONS.

This trial is extremely dissatisfactory to me: the profit is too trifling to mention, whereas the culture was very complete; good justice done to the crop in every circumstance. To what I can attribute the small produce I know not, unless to some unknown quality in the land; for the season though not capitally favourable, yet produced me vast crops in other pieces of ground.

But it cannot be expected that all crops of lucerne should be equally advantageous, or that the product should not sometimes be small without knowing the direct reason, so often as this is the case with all other crops. Lucerne the second year is by no means in perfection. I have no doubt therefore, but the next will be more advantageous; but still 20s. an acre profit, even for the second crop is very low.

EXPERIMENT N<sup>o</sup> 16.

Culture, expences, and produce of two acres, 1767.

## CULTURE.

N<sup>o</sup> 15, continued. The effect of the autumnal manuring shewed itself strongly in the spring, for the lucerne sprung early, and flourished with much luxuriance. To render the recital more simple and explicit, I shall draw into one short view the register of this year's crops, and their application; the cuttings were began as follows:

The first cutting, April 29th; produce 2 tons. 14 cwt. 42 lb. eat by horses, and paid, 1*l.* 12*s.* 1*d.*

The second, May 28th; produce 5 tons, 11 cwt. 86 lb. eat by young cattle, and paid 3*l.* 14*s.* 6*d.*

The third, July 6th; produce 9 tons, 16 cwt. 47 lb. eat by horses, cows, and young cattle, and paid 5*l.* 14*s.* 7*d.*

The fourth, August 15th; produce 9 tons, 18 cwt. 26 lb. eat by sundry cattle, and paid 4*l.* 19*s.* 3*d.*

The fifth, September 24th, produce 6 tons, 16 cwt. 14 lb. eat by dry cows, and young cattle, and paid 3*l.* 12*s.* 6*d.*

Horse hoed it after every cutting, except the last, and hand hoed (weeding at the same time) the rows thrice.

## EXPENCES.

	£.	s.	d.
Five cuttings,	0	10	0
Raking together, carting and loading,	0	15	0
The autumnal manuring,	0	11	6
Four horse hoeings,	0	5	4
Three hand hoeings,	0	19	0
<hr/>			
Rent,	3	0	10
	1	14	0
<hr/>			
	4	14	10
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## PRODUCE.

## PRODUCE.

	Ton. cwt. lb.			£.	s.	d.
First cutting,	2	14	42	1	12	1
Second ditto,	5	11	86	3	14	6
Third ditto,	9	16	47	5	14	7
Fourth ditto,	9	18	26	4	19	3
Fifth ditto,	6	16	14	2	12	6
	34	16	103	19	12	11
Expences,				4	14	10
Profit,				14	18	1
				£.	s.	d.
Manuring,				0	12	6
Horse hoeing				0	8	0
				1	0	6
Clear profit, 6l. 18s. 9½d. per acre.				13	17	7

## OBSERVATIONS.

This crop has paid very amply, although the expence of a rich manuring is added: I am very glad to find it, for the smallness of last year's produce gave me some apprehensions that the land was not of the right sort for lucerne: and several gentlemen, who that year viewed the crop, predicted its dying away this season, from the roots penetrating the white clay, which is the under stratum to a great depth. Such an idea was, however, totally false; for the roots by the end of the several years, were many yards deep in the clay, and consequently much deeper this year; and yet so far was the crop from dying, that the improvement of it is prodigious: there is more reason for supposing, that the deeper it went, the better the crop. This circumstance should not be slighted; for many people may abstain from the culture under a false notion of their crop not continuing: that it will continue for ever, there is no proof, but that there is no reason to expect the crop will immediately die in the manner predicted by many people; and it certainly is of consequence for any person to cultivate this plant who can in that respect have it in their power.

The product of this crop, it is considerable; 17 tons an acre are a very great produce, and the clear profit of 7l. an acre, is a most important object. It is further of consequence to know that such a profit is made, ~~not from one application alone~~, but from several; and upon this point, I may observe, that from these experiments, there is the greatest reason to expect equal profit from lucerne, whether it be applied to the feeding horses, cows, oxen, or young cattle.

## GENERAL OBSERVATIONS ON these EXPERIMENTS.

I shall here, as in the former registered trials, throw all circumstances into one view.

		1765.							
£. s. d.	Ton. cwt. lb.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.	£. s. d.
Expences, 3 11 3	Product, 3 16 0	Value, 1 6 10½	Profit, 0 0 0	Loss, 2 4 4½					
		1766.							
Expences, 5 6 9	Product, 7 4 0	Value, 3 13 11	Profit, 1 0 6½	Loss, 0 0 0					
		1767.							
Expences, 5 15 14	Product, 17 8 51	Value, 9 16 5½	Profit, 6 18 9½	Loss, 0 0 0					
<u>14 13 4</u>	<u>28 8 51</u>	<u>14 17 2½</u>	<u>7 19 4</u>	<u>2 4 4½</u>					
			<u>5 14 11½</u>						
Averages, 4 17 9	— — 9 9 54	— 4 19 0	— 1 18 3½						

This result is by no means of that decisive importance I could wish; but I think it is merely owing to the register not being longer continued. The last year has the advantage of a manuring, and is very profitable; but the first manuring being in the year 1765, a remarkable drought, and while the lucerne was in its infancy, probably occasioned the first return being no larger. There can be no doubt of succeeding crops, had the experiment been continued longer, being of increasing value; for lucerne certainly is not arrived at perfection in the third year; besides the circumstance of the soil under such a culture increasing its fertility. This is sufficient to explain the average profit of the three years being so low as 1*l.* 18*s.* an acre. The great difference between that sum and 6*l.* 18*s.* the profit of the last of those three years (which is the balance after paying a rich manuring) shews plainly that the crop would have proved very profitable had it been longer continued. In this light the present experiment is valuable; for a clear profit of 7*l.* an acre, on a perennial crop little subject to accidents, is undoubtedly far more advantageous than any thing common husbandry can boast; and five times over more beneficial than could by such management be reaped from this land.

EXPERIMENT N<sup>o</sup> 17.

Culture, expences and produce of one acre, field L\* 1766.

In 1759, barley; in 1760, oats; in 1761, clover; in 1762, wheat; in 1763, fallow; in 1764, barley.

CULTURE.

## CULTURE.

Ploughed up the barley stubble, November 8th, 1764; April 17th, 1765, stirred it again. May 14th, the third, ploughing: likewise harrowed and rolled it. June, 1st, the fourth, stirring, and harrowed it, the 8th rolled it; July 11th, the fifth ploughing; the 12th rolled it. August 16th, the sixth, earth and harrowed it. The 26th, the seventh and harrowed it again. March 19th, 1766, the eighth ploughing; the 21st harrowed it. May 22d, the ninth stirring; the 23d, harrowed and drilled it in equally distant rows, two feet asunder.

June 26th, hand hoed it. July 3d, hand weeded it; the 15th, mowed it; the 29th, hand hoed it again. August 6th, hand weeded it; the 20th hand hoed it again: September 6th mowed it again. November 7th, ridged it up with a common plough.

EXPENCES.				£.	s.	d.
Nine ploughings,	-	-	-	0	9	0
Six harrowings,	-	-	-	0	3	0
Three rollings,	-	-	-	0	1	0
Water furrowing twice,	-	-	-	0	1	6
Drilling,	-	-	-	0	0	3
Seed,	-	-	-	0	5	6
Three hand hoeings, at 7s. 5s. and 4s. per acre,	-	-	-	0	16	0
Two weedings,	-	-	-	0	4	6
Two mowings,	-	-	-	0	2	4
Raking together, loading and carrying twice,	-	-	-	0	3	0
Ridging up,	-	-	-	0	1	0
				<hr/>		
Rent, &c. two years,	-	-	-	2	7	1
	-	-	-	1	14	0
				<hr/>		
				4	1	1

PRODUCE.				£.	s.	d.
1 ton of green lucerne, the first cutting, at 7d. per cwt. as before,	-	-	-	0	11	8
1 ton 5 cwt. ditto, the second,	-	-	-	0	14	7
				<hr/>		
				1	6	3
				<hr/>		
Expences,	-	-	-	4	1	1
Produce,	-	-	-	1	6	3
				<hr/>		
Loss,	-	-	-	2	14	10
				<hr/>		
				Brought		

	£.	s.	d.
Brought over,		2	14 10
Ploughing,	1	1	6½
Harrowing,	0	2	3
Rolling,	0	0	1½
Drilling,	0	0	3½
		1	4 2½
Total loss,		3	19 0½

March 23d, 1767. harrowed down the ridges. April 1st hand hoed it; the 25th it was 5 inches high. May 1st, horse hoed it with a common plough, by striking one furrow in each interval; the 12th, ditto again, the contrary side, the 16th it was 11 inches high; the 25th mowed it, the weight 1 ton, 12 cwt. the 28th hand hoed it and weeded the rows. June 2d, horse hoed it, July 13th, cut it a second time; the weight 2 tons: the 15th hand hoed it; the 22d, horse hoed it. September 1st, cut it the third time, the weight 2 tons, 2 cwt. the 4th, horse hoed it. October 10th, cut it again, weight 14 cwt.

	EXPENCES.	£.	s.	d.
Harrowing,		0	0	4
Five horse hoeings,		0	7	6
Three hand hoeings		0	15	0
Four mowings,		0	4	8
Raking together, loading and carrying home,		0	6	0
Sundry expences,		0	4	0
		1	17	6
Rent, &c.		0	17	0
		2	14	6

	PRODUCE.	£.	s.	d.
	Ton. cwt.			
First cutting,	1 12			
Second,	2 0			
Third,	2 2			
Fourth,	0 14			
	6 8 at 7d.	3	14	8

Brought

	£.	s.	d.
Brought over,	3	14	8
Expences,	2	14	6
Profit,	1	0	2
	£.	s.	d.
Harrowing,	0	0	4½
Five horse hoeings,	0	12	2½
	0	12	6½
Clear profit,	0	7	7½

## OBSERVATIONS.

Notwithstanding the fallow preparatory for this crop, one would suppose, sufficient to force any thing; yet we are not to be surprized at the loss of the two first years: for the weight of numerous expences, and two years rent, on the first production of a plant which is several years in coming to maturity, must certainly occasion the first year to be an unprofitable one. This, however, is not the case with the second year; in that, as the lucerne was thoroughly cultivated and cleaned, I expected a considerable profit, and with reason; yet the product is very trifling. I know not what to attribute this to, unless the thickness of the plants in the rows was prejudicial, though the drill shed as little seed as was possible. The want of manuring, however, on this naturally poor soil, could not fail of being attended with evil consequences.

EXPERIMENT, N<sup>o</sup> 18.

Culture, expences, and produce of half an acre, field M\*, 1766.

## CULTURE.

This piece yielded horse hoed turnips in 1765, in the utmost perfection of tillage and manure: they were drawn for cattle in January; the beginning of March, being a remarkable fine and dry season, I made use of it to reverse the turnip ridges (5 feet ones) by one ploughing, and to arch them up by a second: the third week in April harrowed them fine and drilled three rows of lucerne on each; the soil being in admirable order, the plants arose extremely favourable, and grew so fast, that I expected what I never before had reaped, viz. a very profitable crop the first year; the latter end of May, gave an horse hoeing, turning, as usual, a furrow from the ridges, and throwing up a small ridge in the middle of each interval. After which the rows were hand hoed and hand weeded, July 9th, the plants had attained



tained their full growth, viz. 2 feet high, with many forward ones, putting out their blossoms; I then cut, and weighing the produce; it amounted to 1 ton, 9 cwt, of green lucerne, which paid 17s. in feeding two horses: after this, I gave the second horse hoeing, reversing the last, and likewise hand hoed the rows. The plants very soon shot forth again, and flourished away through the end of the summer, with uncommon luxuriance. The middle of October, I cut it again; the produce 1 ton, 6 cwt, value in feeding young cattle, 19s. Horse and hand hoed again, and so left it for the first winter. Proportions *per acre*.

EXPENCES.					£.	s.	d.
Two ploughings,	-	-	-	-	0	2	0
Three harrowings,	-	-	-	-	0	0	4½
Drilling,	-	-	-	-	0	0	3½
Seed,	-	-	-	-	0	7	6
Three horse hoeings,	-	-	-	-	0	2	0
Three hand hoeings,	-	-	-	-	0	8	0
Twice cutting,	-	-	-	-	0	2	0
Raking together, loading and carting,	-	-	-	-	0	3	0
					<hr/>		
					1	5	2
Rent,	-	-	-	-	0	17	0
					<hr/>		
					2	2	2

PRODUCE.										
Ton. cwt. lb										
£. s. d.										
First cutting,	-	-	2	18	0	-	-	1	14	0
Second ditto,	-	-	2	12	0	-	-	1	18	0
<hr/>										
5 10 0										
Expences,	-	-	-	-	-	-	-	3	12	0
<hr/>										
2 2 2										
Profit,	-	-	-	-	-	-	-	1	9	10
<hr/>										
£. s. d.										
Ploughing,	-	-	-	-	0	4	10½			
Harrowing,	-	-	-	-	0	1	1½			
Drilling,	-	-	-	-	0	0	3			
Horse hoeing,	-	-	-	-	0	3	0			
<hr/>										
0 2 5										
<hr/>										
Clear Profit,	-	-	-	-	-	-	-	1	0	7

## OBSERVATIONS.

From this account it appears, that the previous idea I had formed of the crop was not an erroneous one; the product is, for the first year, very considerable: nor do I think that 20s. an acre clear profit can be expected from one in twenty, under the general chance of management. For this reason we should form our idea from the success of this experiment, and determine to prepare for lucerne by an horse hoed crop of an ameliorating plant—few better than turnips. Such a preparatory one should be (like this in question) treated in the utmost perfection of culture, of both tillage and manuring. The operations of horse and hand hoeing not only clean the soil, but mix the dung well with it, which is a matter of much import to the following crop. The product of 3*l.* 12*s.* *per* acre the first year of lucerne, shews the extraordinary efficacy of this preparation: in general the produce is too inconsiderable to pay moderate expences; in the trial before us the expence of a fallow is saved, and yet the lucerne is as good, and probably better than if it had succeeded the completest. There can be no doubt of the future success of this piece; if it yields 20s. an acre profit in its infancy, it certainly will prove of uncommon advantage when at maturity.

EXPERIMENT N<sup>o</sup> 19.

Culture, expences, and produce of half an acre field M\*, 1767.

## CULTURE.

Continuation of N<sup>o</sup> 18. The spring of this year, though much of it was mild growing weather, yet was unfavourable in some late frosts; but the lucerne did not suffer much by them. The first cutting was on the 5th of May, an exceedingly fine crop, the weight 2 tons 3 cwt. 86 lb. which was given to dry cattle, and paid 1*l.* 11*s.* After this, horse hoed the ridges, and both hand hoed and hand weeded the rows. The second cutting was on the 5th of June, exactly a month from the first; the lucerne was two feet high, which is a growth of about three-quarters of an inch *per diem*; it weighed 3 tons 4 cwt. 92 lb. which were given to horses, and yielded the return of 1*l.* 14*s.* 9*d.* Horse hoed again, but the rows did not require hand hoeing. The 9th of July cut it again, a very thick and luxuriant crop of 4 tons 2 cwt. 21 lb. which paid, by feeding young cattle, 1*l.* 19*s.* 8*d.* both horse and hand hoed after this cutting, and also hand weeded the rows. The 12th of August it was ready to cut again, the weight 3 tons, which paid, by various uses, 1*l.* 11*s.* Gave another horse hoeing after this cutting. Cut it for the last time, the 25th of September; but it should have stood longer; the weight was only 1 ton 19 cwt. which yielded 1*l.* 11*s.* Proportions *per* acre.

EXPENSES.				£.	s.	d.
Cutting five times,	-	-	-	0	5	0
Raking together, loading, and carting	-	-	-	0	7	6
Four horse hoeings,	-	-	-	0	2	8
Two hand weedings and hoeings,	-	-	-	0	6	6
				1	1	8
Rent, &c.	-	-	-	0	17	0
				1	18	8

PRODUCE.				£.	s.	d.
	Ton.	cwt.	lb.			
May 5th, first cutting,	4	7	60	3	2	0
June 5th, second,	6	9	72	3	9	6
July 9th, third,	8	4	42	3	19	4
August 12th, fourth,	6	0	0	3	2	0
Sept. 25th, fifth,	3	18	0	2	2	0
	28	19	62	15	14	10
Expences,	-	-	-	1	18	8
Profit,	-	-	-	13	16	2
Horse hoeing,	-	-	-	0	4	0
Clear profit,	-	-	-	13	12	2

## OBSERVATIONS.

This has proved an uncommonly advantageous crop: the product is immense for the second year of lucerne, in which it undoubtedly is not arrived at perfection, and the profit no less considerable. I attribute this great success to the influence of the turnip year. That crop was thrice manured for, very amply, and the tillage in all respects equal. Such a culture was converting the soil into a fine garden mould; and the effect is fully seen in this lucerne. My cultivating it upon this soil is at an end; but having found the plant so greatly profitably, wherever I shall farm, I determine never to be without a crop of it; and the experience of this trial alone, were others wanting, would be a sufficient inducement to cultivate it on this perfect plan, and not to venture the seed in the ground until it is brought to the utmost state of cleanness and fertility. None of my fields are of uncommon value: the turnip loams are sound and good, but they throw out very few valuable crops of the common sort, without the assistance of manure: it is therefore the preparation

paration given by the turnips that occasioned such a great produce of lucerne the second year of the crop, and such an unusual one the first; products much more than sufficient to pay the loss of the turnip year, and leave a greater profit than common husbandry would have given.

Had I continued here, I should have manured it again at the rate of twenty loads an acre this autumn, under the firm persuasion that no use of the dung could pay better, if so well. The product of 15*l.* 14*s.* will keep six horses 29 weeks at 2*s.* a horse; or, in other words, through the summer. I have no idea of any other vegetable equalling such a produce: nor can the farmer, in any other branch, gain 13*l.* per acre per annum profit, from a perennial crop: it may certainly be exceeded by annual and triennial ones, though only in a few instances. But let the reader consider the minute attention, the trouble, the vast expence, and the hazard of renewing crops of this nature. In the present case the year's expence, that brings a return of near 16*l.* amounts not to 40*s.*! which is merely occasioned by the plant being perennial. I will venture also to assert that the culture is very simple, and that the trouble and attention requisite is trifling: considerations of very great importance to all gentlemen.

GENERAL OBSERVATIONS ON EXPERIMENTS N<sup>o</sup> 18 and 19.

The following little table will shew the state of these two years in a clear light.

	£.	s.	d.
1766, expences,	2	11	5
1767, ditto,	2	2	8
	<hr/>	<hr/>	<hr/>
	4	14	1

Average, 2*l.* 7*s.* 0*½d.*

	Ton.	cwt.	lb.	£.	s.	d.
1766, produce,	5	10	0	3	12	0
1767, ditto,	28	19	62	15	14	10
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	34	9	62	19	6	10
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
Average,	17	4	87	9	13	5

	£.	s.	d.
1766, profit,	1	0	7
1767, ditto,	13	12	2
	<hr/>	<hr/>	<hr/>
	14	12	9

Average, 7*l.* 6*s.* 4*½d.*

The prodigious profit of this culture is from hence sufficiently manifest; the average product of 17 tons of lucerne the two first years is much higher than I should have conceived could ever have been gained. As lucerne is in general several years before the product is at the height, this extraordinary growth shews that it may be vastly accelerated by an excellent preparation of the land, which is extremely desirable; for it is rather a discouraging circumstance, when one is to wait two or three years for a reimbursement of expences. I shall therefore venture earnestly to recommend this complete culture for lucerne, as by much the most profitable that can be determined.

### GENERAL OBSERVATIONS ON THE PRECEDING EXPERIMENTS.

It is necessary, for the sake of perspicuity, to draw the result of all these trials into one view, that the reader may at once see the culture, expences, produce and profit of each crop.

#### EXPENCES.

##### FIRST CROP.

	£.	s.	d.
On gravelly loam in equally distant rows, 2 feet; continued 5 years; the average expence of which	2	16	8½

##### SECOND CROP.

On clayey loam fallowed, equally distant rows, 2 feet; manured the first year, 24 loads farm yard compost; and the third, 20 loads, town manure, continued 4 years; average	5	7	7½
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##### THIRD CROP.

On clayey loam fallowed, in equally distant rows, 3 feet; complete culture; manured the fallow year with 20 loads farm yard compost, and the first year's crop with 40 bushels of foot, 40 sacks of malt dust, and 32 loads farm yard dung; the third year with 20 loads, and the fourth with the same; continued four years average,	5	11	11½
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##### FOURTH CROP.

On clayey loam, in treble rows on 5 feet ridges; manured first year with 20 loads farm yard dung; the second the same; continued three years; average	4	17	9
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## FIFTH CROP.

	£.	s.	d.
Clayey loam fallowed: in equally distant rows, 2 feet; continued two years; average,	4	6	2½

## SIXTH CROP.

Gravelly loam, treble rows on 5 feet ridges; continued two years; average,	2	7	0½
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## CROPS FALLOWED and MANURED.

	£.	s.	d.
No 2.	5	7	7½
No 3.	5	11	11½
	<u>10</u>	<u>19</u>	<u>6½</u>

Average, 5*l.* 9*s.* 9½*d.*

## FALLOWED.

	£.	s.	d.
No 5.	4	6	2½

## Neither FALLOWED nor MANURED.

	£.	s.	d.
No 1.	2	16	8½
No 6.	2	7	0½

Average, 2*l.* 11*s.* 10½*d.*

## MANURED.

	£.	s.	d.
No 4.	4	17	9

I do not offer comparisons of this nature, for the minute decision of a point; but only to shew, in general, those circumstances which are peculiarly strong in raising expences. The preparation of a fallow with successive manurings, run up the average expence of four years, to 5*l.* 9*s.* which is very high. This expence may be reduced, and very advantageously, by substituting an horse hoed ameliorating crop; which prepares as well as a fallow without an equality of expence. That the lucerne culture is not of itself expensive, appears very clearly from the average of the crops neither manured nor fallowed, being no more than 2*l.* 11*s.* 10½*d.* which can nowhere, on land, of 17*s.* an acre, be reckoned a great expence.

PRODUCE.

## PRODUCE.

		Ton. cwt. lb.					£. s. d.		
Crop, N <sup>o</sup> 1.	Average of 5 years,	-	10	10	4	-	6	10	6½
— N <sup>o</sup> 2.	Average of 4 years,	-	17	17	51	-	8	2	4
— N <sup>o</sup> 3.	Average of 4 years,	-	21	2	73	-	12	6	3½
— N <sup>o</sup> 4.	Average of 3 years,	-	9	9	54	-	4	19	0
— N <sup>o</sup> 5.	Average of 2 years,	-	4	6	56	-	2	10	5½
— N <sup>o</sup> 6.	Average of 2 years,	-	17	4	87	-	9	13	5

As these terms are so various, the products must not be compared; but an idea may be formed of the proportion between culture and crop on the average: the following table is more explicit, and shews the subject in a different light.

		Ton. cw. lb.					£. s. d.		
N <sup>o</sup> 1.	Continued five years; average of } the two first, - - - - }	-	2	8	104	-	1	12	0½
—	Ditto of the three last, - - - -	-	15	17	50	-	9	16	2
N <sup>o</sup> 2.	continued, four years; average of } the two first, - - - - }	-	8	4	16	-	3	19	0
—	Ditto of the two last, - - - -	-	27	10	86	-	12	6	8
N <sup>o</sup> 3.	continued, four years; average } of the two first, - - - - }	-	13	15	34	-	8	0	1
—	Ditto of the twolast, - - - -	-	28	10	0	-	16	12	6
N <sup>o</sup> 4.	continued three years; average } of the two first, - - - - }	-	5	10	0	-	2	10	4½
—	The last, - - - -	-	17	8	51	-	9	16	5½
N <sup>o</sup> 5.	continued two years; the first, - - - -	-	2	5	0	-	1	6	3
—	The second, - - - -	-	6	8	0	-	3	4	8
N <sup>o</sup> 6.	continued two years; the first, - - - -	-	5	10	0	-	3	12	0
—	The second, - - - -	-	28	19	62	-	15	14	10

From hence we find that under many variations, the first, second and third years are inferior to those which follow; and the first and second much so; the first always. No determinate judgment is therefore to be formed of lucerne from the first and second years, as there is an evident certainty of the following ones, with equal treatment, being superior; and this circumstance should be kept strictly in mind, in considering the produce of some of these experiments that were only continued two years. The second year of N<sup>o</sup> 6. produces the vast weight of near 29 tons; a proof that the 3d and 4th, &c. years would yield yet more considerably.

. The

The greatest products are the following,

	Ton.	cwt.	lb.			£.	s.	d.
The two last years of N <sup>o</sup> 2.	-	-	27 10 86	-	-	12	6	8
The two last of N <sup>o</sup> 3.	-	-	28 10 0	-	-	16	12	6
The last of N <sup>o</sup> 6.	-	-	28 19 62	-	-	15	14	10

These are very great products; and it is much worthy of attention, that they shew plainly the proper culture of lucerne. N<sup>o</sup> 1. is very richly manured twice in four years. N<sup>o</sup> 2. was manured five times in the five years (the fallow one included) and N<sup>o</sup> 6. succeeded horse hoed turnips in the perfection of both tillage and manuring. From whence it is extremely evident, that if you would get great crops of lucerne you should manure for them in the most ample manner. The profit will shew how well the plant is calculated for repaying such great expences.

#### PROFIT.

I shall state this article in the same manner as the last; supposing the beginning of each term as *preparation*; and the latter part as *the crop*.

	£.	s.	d.
N <sup>o</sup> 1. Five years average loss of two first years,	1	8	6½
Ditto profit of three last,	7	2	0½
N <sup>o</sup> 2. Four years loss of the first,	5	7	4
Profit of three last,	5	9	4
N <sup>o</sup> 3. Four years loss the first,	8	0	0
Average profit the three last,	11	12	5
N <sup>o</sup> 4. Three years loss the two first,	0	11	11
Profit the last,	6	18	9½
N <sup>o</sup> 5. Two years loss the first,	3	19	0½
Profit the second,	0	7	7½
N <sup>o</sup> 6. Two years profit the first,	1	0	7
Ditto the second,	13	12	2



The advantage of laying out a sum in *lofs*, for one or two years, in expectation of succeeding *profit*, is here strongly apparent. A small *lofs* for one or two years is sure to bring a vast succeeding annual profit, far beyond the proportion of the *lofs*; and in one instance, where the preparation was by a fallow crop in complete management, even the first year is profitable, and the second prodigiously so.

Crop N<sup>o</sup> 1. without manuring runs up to a profit of 7*l.* 10*s.* *per* acre clear.

N<sup>o</sup> 2. manured, to a clear profit of 10*l.* 18*s.* *per* acre.

N<sup>o</sup> 3. manured, to ditto, of 14*l.* *per* acre.

N<sup>o</sup> 4. manured, to 16*l.* 18*s.* 9½*d.*

N<sup>o</sup> 6. succeeding turnips in complete management, to 13*l.* 12*s.* 2*d.* *per* acre.

These instances are striking; they shew to what the culture of this plant may be carried; for it is the last years of the course of a perennial crop, which demand attention the most, since nothing can be clearer than the improving nature of lucerne; it is at least three or four years in the coming to perfection, and yet the last sum of 13*l.* 12*s.* profit *per* acre is reaped the *second* year. All these degrees of profit are extraordinary; for no common husbandry nearly equals the least of them. The nature of a perennial crop which is not the least hazardous, the expences of which are low, and the culture not at all complex, should always be considered.

These degrees of advantage shew, in a striking manner, the profit of rich manurings for lucerne. The lowest, *viz.* 7*l.* 10*s.* is reaped from the oldest crop, which is an advantage that ought to have rendered it superior to all the rest, and I doubt not would have done it, had it been equally manured. But from the very considerable profit of the manured ones rising to near 17*l.* *per* acre, clear of all charges, the necessity of manuring is sufficiently evident. It also points out the conduct of appropriating the best land in a farm to this culture, for every farmer may depend on one fact, that no crop he can sow will pay him better.

	£.	s.	d.
Profit <i>per annum</i> of N <sup>o</sup> 2.	10	18	0
Of N <sup>o</sup> 3.	14	0	0
Of N <sup>o</sup> 4.	16	18	9½
Of N <sup>o</sup> 6.	13	12	2
<hr/>			
Average, 13 <i>l.</i> 17 <i>s.</i> 2 <i>d.</i>	55	8	11½

• That

That these sums would have been much larger in a few years, cannot be doubted, from the proof I have given of lucerne being so long in its infancy. But taking these particulars as we find them, In what other branch of husbandry are we to gain 13*l.* 17*s.* *per acre per annum*? And from a crop that, compared with all tillage ones, is attended with no more hazard and trouble than meadows and pastures. The culture is neither complex, nor difficult, nor expensive in any thing but manuring. The land is continually improving; for the product is so great, that it pays an annual manuring; and the culture is so perfect, that not a weed is ever to be found.

The above average of 13*l.* 17*s.* will more than keep five horses through a summer of 26 weeks, at 2*s.* *per horse per week*, and 2*s.* *per cow*, and 1*s.* *per head of young cattle*. Let any person judge of the prodigious advantages of maintaining 5 horses on one acre of land: a great farmer who keeps a team of 20 horses, supports them half the year on 4 acres of land, which he may take care to have near his stable for supplying them with food, and for manuring the crop. A person who keeps but one horse, need to have but 32 square perches: and but 64 for a pair of horses: and as it is the same for both cows and horses, let us but reflect a moment on the keeping an hundred cows for six months, on 20 acres of land!

A further consideration of the utmost importance is the prodigious benefit arising from the vast quantities of manure made by such numbers of cattle as may be kept by lucerne. I gave it to my horses in the stable, and kept them littered well with straw or stubble; my draft oxen had it in the ox-house, and cows, and young cattle either in the farm-yard, or in a small grass close: but the best method is ever to confine cattle while they are fed with it, on account of raising dung; and if plenty of litter is provided, it is surprizing to see the quantity of manure that will be raised. Ten loads *per head* for each head of cattle kept through the summer, is a moderate computation, and does not suppose such a plenty of litter as I have often used myself, or as I would always recommend; this is fifty loads from every acre of lucerne; and let me remark, that it is so much gained, by having lucerne, for cattle wandering about a pasture are of no service in manuring it: where they dung or stale, it is so over-done, as to destroy the grass for one year, and probably makes it too rich in trifling patches for several; but all such patches united, would in a large field, form but a trifling quantity of well manured land. Thus the value of 50 loads of excellent dung (that of the litter deducted) is to be added to the profit of the lucerne, and it will be no trifling addition: these 50 loads properly rotten, will manure an acre and half: so that the lucerne finds its own annual manuring, and improves half another acre: a culture so extraordinarily profitable, that too much cannot be said in praise of it.

If my advice was to be asked concerning the best method of treating drilled lucerne, I should answer in a few words, as follows, which are in part, the corollaries of the preceding trials. Choose the richest soil of your farm: without describing particulars, take that which gives in general, the best crops of other vegetables; if flat and wet, drain it. Give a year's preparation by a horse hoed crop of turnips most richly manured for, suppose thirty loads *per acre* of rotten dung. Let the turnips be double rows on five feet ridges. After they are off, reverse the ridges, and plough them backwards, and forwards till they are in good tilth; then arch them up and harrow fine, and on the top of each drill three rows of lucerne at one foot asunder. *Keep the crop ABSOLUTELY and TOTALLY free from weeds.* Always horse hoe directly after each cutting, and hand hoe the spaces between the rows as often as necessary, to keep them in fine tilth, and free from weeds. Those that come up among the plants in the rows to be weeded out; or cut out by a stroke of a strong sharp narrow hoe. Manure every year (after the first) with 20 loads *per acre*, of rotten dung; or tantamount of some other sort; which should be laid on either in autumn or during an hard frost. I will not assert that this conduct shall exceed all others; but I will answer for its proving far more profitable than a good crop of wheat every year on the same land.

S E C T.

## S E C T. II.

## Of the CULTURE of LUCERNE broadcast.

**M**R. Millar's recommendation of drilled lucerne, preceding any publication that taught the broadcast culture, the latter did not spread so soon as the former. But Mr. Rocque's treatise on this mode of sowing being apparently founded on experience, and describing it as a common culture in several provinces of France, together with the compendiousness of all broadcast operations occasioned many persons to listen with pleasure to a man who promised great profit from lucerne with no more trouble than is every where taken with clover. In the introduction of any new branch of culture, exaggerations are sure to abound; the vanity of those who call themselves the fathers of any system, will certainly carry matters beyond the reality; but it belongs to others, who go more coolly to work, to examine by the keen and accurate test of experiment, every assertion; to accept none, because boldly ushered into the world; to reject none, because unpossessed of those showy ornaments which philosophical genius's throw out to catch attention: when every point is examined in such an impartial manner TRUTH rises triumphant: she would never have been obscured had experimenters thought there was as much reputation in registering unsuccessful trials, as the most brilliant ones; which is certainly the fact.

EXPERIMENT N<sup>o</sup> 1.

Culture, expences, and produce of a rood, field L\*, 1765.

This rood was one of the pieces I sowed for nurseries to transplant from, according to the excellent Mr. Harte's plan, which I pursued; but the number of plants drawn from this was so very inconsiderable in comparison to those left, as no where to be missed, I therefore determined to preserve the piece and manage it according to the directions of Mr. Rocque. I shall, however, give an account of the previous culture.

In 1764 the field yielded barley, the stubble of which was turned in the beginning of November ; it was again ploughed clean the 17th of April, and again the 29th, and the next day harrowed. The 9th of May it was ploughed to the depth of twelve inches, with two ploughs and six horses, and harrowed and rolled as soon as dry enough. The 11th, was ploughed and harrowed, and the 13th stirred again for the sixth time, and harrowed, rolled, and sowed ; and then harrowed and rolled again, leaving it in perfect order. The quantity of seed was 16lb. The weather was fine and dry, till the 23d, when the plants were brought up very thick by some showers. They were extremely backward till the 14th of June, when a fine rain fell, to its great refreshment : it then received a weeding by hand. The succeeding drought which lasted till the 13th of August, kept it low, and its appearance was very sickly, the best plants not being, on an average, above seven inches high. In fine, it was mowed the end of October, and the produce so trifling that it could scarcely be raked together. I must here observe, that I attributed the ill success of it to the excessive thickness of the plants ; for very near it some few plants grew in a bed of sainfoine of the same seed, sowed nearly at the same time, which standing singly, flourished greatly, and were cut twice by the end of October.

In 1766 it was, early in the spring and before any other vegetable moved, of a most beautiful green, and some inches high ; but it was not high enough to cut until the 18th of June ; and, through curiosity, I ordered six cart-horses which ploughed every day, to be fed with nothing but the produce, and it lasted them just four days. These horses were fed, except those days, with mown clover in the stable. The proportion to an acre would be maintaining two horses forty-eight days. Two days after I harrowed it with half an exceeding strong pair of harrows, loaded so heavy as to cut three inches into the ground. This harrowing collected a large heap of rubbish on the head land.

August the 1st, I cut it a second time, and weighed the produce immediately ; it was 13cwt. (2ton. 12cwt. *per acre*) with which I fed four cart horses that eat nothing else six days, which is exactly two horses forty-eight days, the same produce as before ; and it being forty-four days since the last cutting, an acre hitherto finds green fodder sufficient for two horses. The 2d, I harrowed it thoroughly, tearing up most of the weeds and rendering the surface crumbly.

October 7th, cut it again, and weighing the produce directly, found it 8cwt. I gave it to some working oxen, but kept no account how long it lasted ; for the quality of it was so bad that no conclusions could have been drawn from it. It was in some measure withered, and many of the leaves dropped off. This I attributed to the dryness of the season, and the thickness of the plants. I shall stop here to minute the expences and produce of this rood.

EXPENCES.

## EXPENCES.

	£.	s.	d.
Five ploughings,	0	1	3
Five harrowings,	0	0	7½
One trench ploughing,	0	2	0
Three rollings,	0	0	3
Sowing,	0	0	1
Seed,	0	16	0
Weeding,	0	4	0
Four mowings,	0	1	0
Raking together, loading and carrying, at 1s. 6d.	0	1	6
Twice harrowing with four horses,	0	1	0
Rent, &c. for two years,	1	7	8½
	0	8	6
	1	16	2½

## PRODUCE.

	£.	s.	d.
Two cuttings; the weight 1 ton 6cwt. at 7d. per cwt.	0	15	2
One ditto, 8cwt. half price,	0	2	4
	0	17	6
Expences,	1	16	2½
Produce,	0	17	6
Loss; the balance of the first two years,	0	18	8½

	£.	s.	d.
Ploughing,	0	3	0½
Harrowing,	0	0	5½
Rolling,	0	0	0½
Trench ploughing,	0	5	0
Harrowing to clean,	0	2	6
	0	11	0
Total loss, 5l. 18s. 10d. per acre,	1	9	8½

## OBSERVATIONS.

\* This crop, could have no benefit from horse or hand hoeing, which in dry seasons must have great effects, I apprehend suffered for want of rain, which I could not perceive to be the case with any other crops of lucerne. The harrowing cannot possibly supply this deficiency: the plants were extremely thick, and might insure the crop in one respect, but it favoured it in another, viz. choking the weeds, for scarce any of consequence stirred in it, which I am confident they would have done, had it been thin sown. So great a loss as 5l. 18s. 10d. per acre, at the end of two years, on a crop which I cannot suppose to stand above four or five at farthest, has a very bad appearance, and gives me no great opinion of this method.

EXPERIMENT, N<sup>o</sup> 2.

Culture, expences, and produce of a rood, 1767.

## CULTURE.

N<sup>o</sup> 1. continued. May 25th, mowed it; weight 6 cwt. Gave it to three cow kine and two large oxen; it lasted the former three days, and the latter two. The first must be worth 2s. and the latter I calculated at 1s. 6d. This is the fairest way I can divide it, and it amounts to just 7d. *per* cwt. and as that is a trial with different cattle from the last, it is a confirmation of that valuation. After the cutting harrowed it with four horses. August 12th, mowed it the second time, weight 9cwt. 5lb. and made it into hay. The 14th and 16th much rain fell; the 17th, it was dry, and made, weight 3cwt. 10lb. October 10th, cut it the last time, weight 3cwt. The hay prevented my harrowing it after the second cutting.

## EXPENCES.

	£.	s.	d.
Three mowings, - - - - -	0	0	10
Harrowing, - - - - -	0	0	6
Raking together, loading and carrying, - - -	0	1	1½
Sundry expences, - - - - -	0	0	8½
	<hr/>		
	0	3	2
Rent, &c. - - - - -	0	4	3
	<hr/>		
	0	7	5

## PRODUCE.

	£.	s.	d.
First cutting, - - - - - 6 cwt.			
Second ditto, - - - - - 9			
Third ditto, - - - - - 3			
	<hr/>		
	18		
	<hr/>		
			at 7d. <i>per</i> cwt.
Expences, - - - - -	0	10	6
	0	7	5
	<hr/>		
Profit, 12s. 4d. <i>per</i> acre, - - - - -	0	3	1
Harrowing, - - - - -	0	1	3
	<hr/>		
Clear profit, 7s. 4d. <i>per</i> acre, - - - - -	0	1	10

## OBSERVATIONS.

The result of this experiment is with me decisive, and will always keep me from sowing any large quantity of it upon such a soil in this manner; for although

though I apprehend the thickness of the plants prejudicial, yet the weeds would have been proportionably more numerous and troublesome. I do not, however pretend to state the degree of loss suffered by the thick sowing; my inducement for doing it was reading the chapter on the broadcast method in Mr. Harte's Essays, who is of M. Du Hamel's opinion, in advising a large quantity of seed. The trench ploughing so late was also a great error.

EXPERIMENT N<sup>o</sup> 3.

Culture, expences, and produce of half a rood, field L<sup>a</sup>, 1765.

## CULTURE.

This piece yielded horse hoed wheat in 1764, in the perfection of both tillage and manure, the ridges of which were reversed in November of the same year, and the land water furrowed. In March, ploughed down the ridges. April 11th, stirred it again, and harrowed it fine; the 17th, ploughed and sowed it with 24lb. of seed, and harrowing it thrice, it came up very favourably by the end of the month, scarce any weeds in it. Throughout May it flourished away very finely; a drought succeeded from the 23d of May till the 14th of June, which kept the young plants rather backwards, but did not seem to affect them near so much as might have been expected, not near so much as some other crops that had not the same advantages as this. July 17th, it was high enough to cut, considering the extreme drought of the season, the product weighed green 6cwt. or *per acre* 48cwt. which was given to a cart horse, and it lasted him twelve days, being in value 3s. 6d. or *per acre* 1*l.* 8s. The drought continued until the 13th of August, yet the lucerne shot up again, and in about a week became quite green. The rain which fell the 13th brought it on very fairly, insomuch that it was an handsome crop by the 24th of October, when I mowed it again; the produce 9cwt. or *per acre* 2 ton. 3cwt. 12lb. It lasted a horse two weeks and a half; value 5s. or *per acre* 2*l.* Proportions *per acre*

EXPENCES.						£.	s.	d.
Four ploughings,	-	-	-	-	-	0	4	0
Six harrowings,	-	-	-	-	-	0	0	9
Water furrowing,	-	-	-	-	-	0	1	0
Seed,	-	-	-	-	-	1	3	4
Sowing,	-	-	-	-	-	0	1	0
Cutting twice,	-	-	-	-	-	0	2	0
Raking together, loading and carting,	-	-	-	-	-	0	3	0
						<hr/>		
						1	15	1
Rent, &c.	-	-	-	-	-	0	17	0
						<hr/>		
						2	12	1
						<hr/>		



## PRODUCE.

		Ton. cwt. lb.			£.	s.	d.
July 17th, First cutting,	-	2 8 0	-	-	1	8	0
Oct. 24th, Second ditto,	-	3 12 0	-	-	2	0	0
		<hr/>			<hr/>		
		6 0 0			3	8	0
Expences,	-	-	-	-	2	12	1
					<hr/>		
Profit,	-	-	-	-	0	15	11
				£.	s.	d.	
Ploughing,	-	-	-	0	9	7	
Harrowing,	-	-	-	0	2	3	
				<hr/>			
					0	11	10
					<hr/>		
Clear profit,	-	-	-	-	0		

## OBSERVATIONS.

The whole range of experimental agriculture is one continued proof of the advantages of spirited husbandry. Bad seasons will come; but then badly managed crops are those which suffer most. I had broadcast lucerne sown this year that was cut but once by October, and the produce then too trifling to mention; but that crop was sown after corn in common management, the difference of which is prodigious, from sowing after a horse hoed crop in perfect culture: the young lucerne having, in the latter case, fine rich mould to shoot into, struck its roots some depth before the drought came on, so that it was able to support it. In one respect the dry weather was advantageous, for the weeds did not arise at all in this piece, which, however, was partly owing to the preceding crop being kept thoroughly clean, as horse hoed ones always are. As to the profit being very trivial we are not at all to be surprized at it; lucerne the first year makes no figure: nor can I hear that any person ever cultivated it under the expectation of profit the first year; the paying its own expences is evidently as much as can be reasonably thought of, and doing this in an unfavourable season is somewhat extraordinary, but must be attributed to the fertility and excellent order in which the land was brought by the horse-hoeing preparation. Respecting the quantity of seed, 20 lb. an acre is I apprehend, from the appearance of this crop, a very proper quantity for land in such order as this was. I have a rood near it that was sown with a much larger quantity, which is evidently overseeded.

EXPERIMENT, N<sup>o</sup> 4.

Culture, expences, and produce of half a rood, field L<sup>2</sup>, 1766.

## CULTURE.

The continuation of No 3. The lucerne appeared very early in the spring, branching very luxuriantly, and carrying a most even and beautiful appearance. May 23d, it was fit to cut; the produce 8 cwt. which I must value at 7*d.* as no minute was taken of the time it lasted the cattle to whom it was given it, is 4*s.* 8*d.* or *per* acre *1*l.** 17*s.* 4*d.* After this cutting, I followed Mr. Rocque's direction, and harrowed it with a loaded harrow as much as four horses could drag. The weeds were not numerous; but as some had appeared, and the stirring the surface must be useful, I performed the operation. The lucerne did not seem to suffer by it, for a fresh crop presently appeared; and notwithstanding the wetness of the season, scarcely a weed was to be seen, which I must own much surprized me. I mowed it the second time, August 11th, when the produce amounted 9 cwt. 16lb. which lasted two horses 9 days; the value 4*s.* 10*d.* or *per* acre *1*l.** 18*s.* 8*d.* the crop continuing clean, I did not harrow it again; that operation appears to be so violent an one, that an annual harrowing I should think sufficient. I got a third cutting, but it was not ready until the 29th of October, and then not a complete crop, the weight 7 cwt. 47lb. which paid me in feeding young cattle, at 1*s.* a head, 4*s.* or *per* acre *1*l.** 12*s.* I cleansed the water furrows and manured it with three loads farm yard dung, and so left it for the winter.

## EXPENCES.

	£.	s.	d.
Mowing thrice,	0	3	0
Raking together loading and carting,	0	4	6
Harrowing,	0	2	0
	<hr/>		
	0	9	6
Rent,	0	17	0
	<hr/>		
	1	6	6

## PRODUCE.

			Ton. cwt. lb.					£.	s.	d.
May 23d, first cutting,	-	-	3	4	0	-	-	1	17	4
August 11th, second	-	-	3	13	16	-	-	1	18	8
October 29th, third,	-	-	2	19	40	-	-	1	12	0
			<hr/>					<hr/>		
			9	16	56	-	-	5	8	0
Expences,	-	-	-	-	-	-	-	1	6	6
			<hr/>					<hr/>		
Profit,	-	-	-	-	-	-	-	4	1	6
Harrowing,	-	-	-	-	-	-	-	0	5	0
			<hr/>					<hr/>		
Clear profit,	-	-	-	-	-	-	-	3	16	6
			<hr/>					<hr/>		

## OBSERVATIONS.

I think such of our common farmers as would ever listen to a branch of culture out of the general course, would not reject that of broadcast lucerne, from the result of this experiment. The sum of 3*l.* 16*s.* 6*d.* clear profit from one acre of a crop that costs, rent included, but 1*l.* 11*s.* 6*d.* is much more beneficial than what any of them can reap from the crops usually cultivated by them. Here are no expences of a renewal each year; nor any of those numerous adverse chances which so often blast a farmer's hope, when founded on much higher expences than these. I speak here of lucerne in the hands of common farmers, because I am sensible that if they ever cultivate it, it will be in this method and no other: a profit of three pounds an acre gained by such compendious management, will strike them far more than four times the sum coming from a crop that is sown in rows and horse hoed, &c. The latter is undoubtedly far more profitable than the former; but while the conduct of the crop is founded on principles so very different from any thing they have been accustomed to, one cannot wonder at their rejecting it.

Respecting the present crop, I scarcely know what to think of it; the product is considerable, and the clear profit by no means trifling: but then I am persuaded that very many common farmers equal, if not exceed it, from clover, at two cuttings. That grass sown on land in as good order as this, would, I am well assured, yield as great a profit; it is therefore evident, that the merit of the lucerne must depend on its duration: clover will last in good perfection three years; and a point of much importance is its coming by means of being sown with corn, immediately to perfection; whereas the first year of the lucerne yielded scarcely any profit. Future

trials must decide this point; as it is one that depends, I think, merely on duration.

EXPERIMENT N<sup>o</sup> 5.

Culture, expences, and produce of half a rood, field L\*, 1767.

## CULTURE.

Continuation of N<sup>o</sup> 4. The manuring given the preceding autumn to this crop shewed itself in the early luxuriance of the lucerne; but I was somewhat alarmed with a rather formidable appearance of weeds among the plants; I had expected that the harrowing given last year, had prevented any such sight. However, I determined to harrow it thoroughly after the first cutting this spring, to eradicate them at once, as it was extremely evident, if they were left, they would presently demolish the crop. May 27th, cut it for the first time; the produce 8 cwt. 64 lb. or *per* acre, 3 ton. 8 cwt. 64 lb. It paid me by feeding young cattle 4s. 4d. or *per* acre 1l. 14s. 8d. Directly after I harrowed it twice up and down, and then a second time across, which tore up most of the weeds, though not all. but it likewise shattered in pieces many of the lucerne plants, insomuch that I was afraid I had been too violent in the operation. The season coming on fine growing weather, the lucerne did not shew much the worse for this rough treatment, though in some places too many plants were manifestly destroyed: which made me determine not to harrow it any more until the spring following. But what concerned me more, was the appearance of much natural grass among the plants, that had escaped the harrows and now flourished with the crop: my experience of other crops of lucerne made me fear this enemy more than any other; but I could see no remedy for it.

July 28th, cut it the second time; the weight 10 cwt. 17 lb. *per* acre, 4 ton. 1 cwt. 24 lb. It paid me in feeding cows 6s. 9d. or, *per* acre 2l. 14s. With the young growth that followed this cutting, so many weeds arose, that I was quite perplexed to know what to do with them: the third crop was not a full one; it was cut September 25th, produce 6 cwt. 17 lb. no small quantity of it, weeds and natural grass; this is *per* acre, 2 ton. 19 cwt. 24 lb. No account being kept of the application, I value it at 7d. which is 3s. 7d. or *per* acre, 1l. 8s. 8d.

## EXPENCES.

		£.	s.	d.
The autumnal manuring,	- - - -	0	9	6
Water-furrowing,	- - - -	0	0	3
		<hr/>		
B b 2	Carried over,	0	9	9

	£.	s.	d.
Brought over,	0	9	9
Mowing thrice,	0	3	0
Raking together, loading, carting and harrowing,	0	4	6
Harrowing,	0	4	0
	1	1	3
Rent, &c,	0	17	0
	1	18	3

## PRODUCE.

	Ton.	cwt.	lb.	£.	s.	d.
May 27th, first,	3	8	64	1	14	8
July 28th, second,	4	1	24	2	14	0
September 25th, third,	2	19	24	1	8	8
	10	9	0	5	17	4
Expences,				1	18	3
Profit,				3	19	1
				£.	s.	d.
Manuring,				0	15	0
Harrowing,				0	10	0
				1	5	0
Clear profit,				2	14	1

## OBSERVATIONS.

The result of this year's crop is very unfavourable to lucerne in this culture: the profit is much less than that of the second year; which is counter to the nature of the plant; for when it is managed in perfection, it always improves greatly the third year; so that the falling off proves very clearly, that in this mode of cultivation the plant has not fair play. The severe harrowing given it in the spring not being sufficient totally to destroy the weeds, but leaving an appearance very threatening to the succeeding crop, though at the same time it damaged the lucerne, is a circumstance that leaves very little hope of being able to keep a broad cast crop clean: hand weeding or hand hoeing would prove quite inadequate; the plants are too thick to admit any such operations; and the natural grass so interwoven with the lucerne, that they could not be separated.

The

The profit of this crop is not to be slighted on comparison with common husbandry, as it is the product of a third year, without the expence or hazard of a renewal. But it is very clear to me that clover, would have paid better, or at least as well.

### GENERAL OBSERVATIONS ON EXPERIMENTS N<sup>o</sup> 3, 4, and 5.

The culture given to this plant in these trials, I do not apprehend, was in any respect deficient according to the broad cast principles; the soil was in great heart, and admirably well prepared; but before I examine these points, let me state the general account of the crop.

				1765.											
£.	s.	d.		Ton. cwt. lb.		£.	s.	d.		£.	s.	d.			
Expences,	3	3	11	Product,	6	0	0	Value	3	8	0	Profit,	0	4	1
				1766.											
Expences,	1	11	6	Product,	9	16	56	Value,	5	8	0	Profit,	3	16	6
				1767.											
Expences,	3	3	3	Product,	10	9	0	Value,	5	17	4	Profit,	2	14	1
	<u>7</u>	<u>18</u>	<u>8</u>		<u>26</u>	<u>5</u>	<u>56</u>		<u>14</u>	<u>13</u>	<u>4</u>		<u>6</u>	<u>14</u>	<u>8</u>
Averages,	2	12	10½		8	15	18		4	17	9½		2	4	10½

As a crop that is upon the whole, profitable, I may recommend this; but on comparison with lucerne, under a better culture, or in comparison with the farmer's grass, clover, it cannot be recommended.

It succeeded wheat horse hoed, and cultivated, in the utmost perfection of both tillage and manure, which is perhaps as good a preparation for a crop as can be desired; after this, it receives an ample manuring. Now with such treatment, clover in three years would have paid far more than the above average of 2*l.* 4*s.* 10½*d.* per acre; of this there cannot be any doubt: I have had crops well prepared for, that have paid me nearer 5*l.* an acre. Nor is this the only superiority of clover; I have little doubt but wheat after broadcast clover would be far better than after broadcast lucerne; for the clover roots must, I think, prove a much better manure than those of the lucerne, which strike singly perpendicular, and are dreadfully difficult to plough up, so as to make such neat work as clover land tillage for wheat harrowed in. In drills this plant keeps the land in fine order, and under a constant state of preparation, from the tillage and manure bestowed: the soil is kept clean as any garden, and perfectly fine.

Further, it should be observed, on the above table, that the increase of product from the second to the third year, is very inconsiderable, were it only

only relative to the natural improvement of the plant in the beginning of its growth: but when the rich manuring in the autumn of the second year is considered, the increase is contemptible: I apprehend this is owing to the bound state of the surface in a crop sown promiscuously after two year's growth: the manure could not reach many of the lucerne roots: but when the crop is in rows, the soil all kept in such excellent tillage, that whatever manure is added, is sure to take great effect. It is presently mixed with the mould, and laid by the horse hoeings immediately to the roots, so that you directly reap a proportioned crop. Add to this, there are no weeds to share the benefit; which is impossible to be the case with broadcast crops. In the above table, we find the increase of produce, in consequence of the age of the crop and the manuring, to be so small, that the profit is above twenty shillings less the third year than the second: I have never found this to be the case, either in my drilled or transplanted crops.

Upon the whole, this crop gives me no reason to recommend the broadcast culture of lucerne: common farmers will find clover more profitable; and as to gentlemen, they have not the same motive for being so desirous of common methods. But let it be remembered, that I speak only from this experiment; from the result of which I drew the above conclusions.

#### EXPERIMENT, N<sup>o</sup> 6.

Culture, expences, and produce of three acres, field P<sup>a</sup>, 1767.

#### CULTURE.

Sown broadcast with barley, in April, 1766, on a very complete fallow, from autumn 1764, of eleven ploughings, besides many harrowings and rollings; 20lb. of seed *per* acre, and two bushels of barley, both harrowed in together. The barley was a middling crop, and the lucerne appeared amongst it very regularly, insomuch that I had little doubt of a crop. After the barley was mown it arose to a small growth, sufficient to shew that it had failed in very few places; the surface was in general covered with it. April 13th, it was a fine young growth, though not so forward as I have known lucerne without being manured. I was then much distressed for sheep feed, my mowing ground suffering much by such early feeding. I turned 45 sheep into this piece of lucerne, and it kept them three weeks, which, at the lowest estimation cannot be reckoned at less than 4*d.* a week; in so distressing a time 6*d.* I believe would be nearer the value; but at 4*d.* the amount of the feed is 45*s.* or 15*s.* *per* acre, which is considerable, nearly paying the rent of the land before other grasses afford the least bite. After this feeding I mowed it

for

for foiling horses, and for feeding young cattle and cows throughout the summer, but not at stated growths, some being cut every three days. I began to mow the last week in May, and it kept two horses and two young cattle 19 weeks, and two cows ten weeks; value 6*l.* 14*s.* in all 8*l.* 19*s.* or *per acre* 2*l.* 19*s.* 8*d.*

EXPENCES.						<i>l.</i>	<i>s.</i>	<i>d.</i>
60lb. of feed, at 1 <i>s.</i>	-	-	-	-	-	3	0	0
Sowing,	-	-	-	-	-	0	1	6
Harrowing,	-	-	-	-	-	0	0	4½
Mowing, to the proportion of two full crops,	-	-	-	-	-	0	6	0
Raking together, loading and carting ditto,	-	-	-	-	-	0	9	0
						3	16	10½
Rent. &c.	-	-	-	-	-	2	11	0
						6	7	10½
PRODUCE.						<i>l.</i>	<i>s.</i>	<i>d.</i>
Sheep feed and mowings,	-	-	-	-	-	8	19	0
Expences,	-	-	-	-	-	6	7	10½
Profit,	-	-	-	-	-	2	11	1½
Harrowing,	-	-	-	-	-	0	1	1½
Clear profit, 16 <i>s.</i> 8 <i>d.</i> <i>per acre</i> ,	-	-	-	-	-	2	10	0

## OBSERVATIONS.

This year's crop taken alone, is not a complete view of the culture of a plant whose principal perfection is its duration. This year the whole expence of feed is charged, although that is a previous one to several years produce. From the appearance of the crop I have little doubt but it would have lasted, in pretty good perfection, two years longer; perhaps three; but of that I am uncertain: in such case the culture would certainly be much more profitable than it appears in this trial. But still I do not think it would equal clover on the same land, one year with another.

This was the only crop I ever applied to the spring feeding sheep, an use of much consequence, and which; I apprehend would pay better than any other application, when the land is so richly manured as to push the crop forward very early in the year. I have had many of this sort, that have been of a sufficient growth for sheep by the middle of March; but such a vegetation depends quite on the richness of the manurings. In this light I think lucerne

appears.



appears to uncommon advantage, for to be able to turn one's sheep and lambs by that time into a fine nourishing bite, is what the common husbandry cannot by any means command; clover will never do it. Had I continued longer on this farm. I should have made more trials on this circumstance to discover in what degree and to what value *per* acre lucerne can be depended on for the spring feed of sheep.

#### GENERAL OBSERVATIONS ON these EXPERIMENTS.

The broadcast culture of lucerne is not, upon the whole, advantageous in these trials; for so I must be allowed to consider the acquisition of a small profit, exceeded infinitely by a more attentive management of the same plant in the hands of gentlemen, and also exceeded by a common vegetable (clover) in the hands of farmers: It does not therefore appear to whom this method of cultivating it can be of use. But let the reader observe, that I here speak the result of my trials alone; I offer no general random assertions, for this management may probably be more proportionably advantageous on other soils, and better, perhaps, under variation of conduct; but this point I leave to the experience of others. I have more than once heard of immense profit from broadcast lucerne; but supposing the fact, it proves but little, unless we are at the same time informed of the nature and precise value of the soil. What would be the profit of clover, or drilled lucerne on it? Such attendant circumstances are dropt: that is, we hear but half the truth. However, I again repeat, that my trials do not prove the matter on other soils: and wherever I go, I shall extend and vary these trials, that I may be able to decide the point on other soils.

## S E C T III.

## Of the C U L T U R E of L U C E R N E transplanted.

**S**O complete and accurate a treatise on transplanted lucerne, has appeared in our language, that the subject requires very little introduction. I am not surprized, that this garden culture of lucerne, should have been thought of: it is a plant that shews such an amazing luxuriance of growth, when very carefully attended to, that great effects might reasonably be expected from it in the most correct management. I have observed single plants with a little hoeing and manuring, in the beginning of my attending to lucerne, make shoots of surprizing vigour: a whole crop planted singly, could not fail of reaping the same advantages.

EXPERIMENT N<sup>o</sup> 1.

Culture, expences, and produce of one third of an acre, part of field L\*, 1765.

It was the perusal of *Essays on Husbandry*, which induced me to make an experiment on transplanted lucerne. I read that book with great attention several times, and concluded, that some one of my fields would do for this useful plant. But to satisfy myself on this head, I wrote to the benevolent author, describing several fields, and desired to be informed which would suit it best. With great good humour he answered all my queries, and pitched on this field as the most proper one for the experiment. The barley stubble was ploughed in the beginning of November 1764. The 17th of April 1765, it received another clean earth. May the 14th, a third time, and was also harrowed. June the 1st, ploughed the fourth time and harrowed; the 8th rolled. July 11th, ploughed the fifth time, and the next day rolled. August 16th, ploughed the sixth time, and harrowed.

As to the nursery, it consisted of a rood of land thoroughly ploughed, harrowed, &c. and sowed the 13th of May. Unfavourable weather, kept the plants so backward, that on the 16th of August they were not, on an average, above 7 inches high.

The 17th, I began the transplantation. The mean height of the plants I chose was about ten inches; the roots about four, five, or six inches long. I followed that most excellent cultivator's instructions with the greatest exactness, omitting nothing but the manuring, and watering the holes\*. I struck the holes three feet four inches distant from each other, and pursued his directions in the manner of placing the plants in the ground. I continued the transplantation the 20th, 21st, 22d, and 23d, in which time a boy and one man did fifteen rows. I shall here observe that I cut off the tap roots and herbage, and threw them into a vessel of water: I chose to perform this work myself, least any mistake should be made by my people. The weather continuing very hot and dry, the plantation turned so yellow, and appeared so very sickly, that I was fearful of venturing any further.

September 1st, they wore a very indifferent appearance, but it was some satisfaction to find that many of the plants in the first rows, were putting forth young shoots from the bottom of the stems. By the 14th, the weeds began to appear, and the extreme dry weather was so unfavourable to the plants, that I had very little hopes of their living; but to assist them as much as possible, I directed them to be hand hoed, effectually cutting up all the young weeds, stirring the whole surface, and earthing up the plants, which I did to prevent the frosts raising them out of the ground. This operation was performed at different times, between the latter end of September and the 20th of October, as the weather best allowed,

But all my care and precautions were attended with but little effect, for great numbers of the plants were either lifted out of the ground, or killed by the frosts in the following winter; insomuch that in April 1766, not above one plant in three survived, and those which did, appeared poor and stunted, and were not to be compared with some that grew broadcast in the same field: however, I ordered the weeds to be hoed out, and the living plants to be earthed up; this operation was performed between the 21st of April and the 12th of May. The 15th I began to fill up the numerous vacancies with fresh plants from the nursery. This work employed two men three days. June 13th, the rows were hand hoed; and the 17th horse hoed with a common plough, throwing up a narrow ridge in the middle of every interval; but some plants being a little buried by the plough, I thought it best to cut them, which was done the 21st with a knife by hand, grasping the shoots in one hand and cutting them with the other. The produce too inconsiderable to weigh; I gave it to a sow with pigs and she devoured it presently. July 14th, the rows were hand hoed again, the weeds all cut up,

\* But here I should remark, that I pursued my directions too exactly, particularly in taking plants sown only last spring under the idea of necessity, when I could have had old plants, and which I found in another trial, not made from any instruction, to be much preferable: but in the present trial, I supposed myself in the state of one who must follow the book implicitly.

up, those which grew close to the plants picked out by hand, and the earth well loosened about them. The 16th, horse hoed the intervals again splitting the former ridge and throwing it on each side towards the plants; after this horse hoeing, the old plants grew vigorously, but those which were replanted continued weak.

August 27th, cut them again in the same manner as before, and immediately weighed the produce, which amounted exactly to 1068 lb. or 9 cwt. 2 qrs. 4 lb. which would be *per acre*, 28 cwt. 2 qrs. 12 lb.

September 3d, I gave it another horse hoeing, by again throwing a ridge up in the middle of the intervals, leaving the plants on a slip about seven or eight inches broad, with a furrow on each side. The 4th, I hand hoed the rows, and notwithstanding all former care, much grass and weeds had rose amongst the plants, all were carefully extirpated, and those plants which the plough had buried, uncovered. This operation is so necessary, that I do not think it can be omitted after any horse hoeing.

October 15th, it was cut for the last time, and weighed immediately; the produce 1160 lb. or 10 cwt. 1 qr. 12 lb. *per acre* 31 cwt. 8 lb. The rood of broadcast adjoining, was cut about a week before, but quite withered, and almost leafless; but this was of a fine verdure.

The 20th, manured it, and November 5th horse hoed it again, splitting the former ridge, and opening a deep furrow in the middle of each interval to lay the rows dry against winter: also cut two water furrows through it.

Here I shall make a pause in this experiment, and state the expences and produce of it.

#### EXPENCES of the two first Years.

	<i>l.</i>	<i>s.</i>	<i>d.</i>
Six ploughings,	0	2	0
Three harrowings,	0	0	6
Three rollings,	0	0	3
Digging up the roots and transplanting,	0	8	0
Five hand hoeings,	0	12	6
Water furrowing,	0	0	6
Collecting together, loading, and carrying,	0	1	6
Filling vacancies,	0	6	0
Five horse hoeings,	0	1	8
Three cuttings,	0	2	6
Water furrowing,	0	0	4
Two years rent, &c.	0	11	4
	<hr/>		
	2	7	3

				PRODUCE.			£. s. d.		
Value of the first cutting,	-	-	-	-	-	-	0	0	2
	Ton. cwt. qr.								
Ditto of the two others,	-	-	-	9	2	4			
				10	1	12			
	19	3	16	of green lucerne at 7d per acre,			0	11	6
							0	11	8
Expences,	-	-	-	-	-	-	2	7	3
Product,	-	-	-	-	-	-	0	11	8
Loss, 5l. 6s. 9d. per acre,	-	-	-	-	-	-	1	15	7
				£. s. d.					
Ploughing,	-	-	-	0	4	9½			
Harrowing,	-	-	-	0	0	4½			
Rolling,	-	-	-	0	0	0½			
Horse hoeing,	-	-	-	0	2	8½			
							0	7	11
Total loss, 6l. 11s. or per acre,	-	-	-	-	-	-	2	3	6

EXPERIMENT N<sup>o</sup> 2.

Culture, expences, and produce of one-third of an acre, 1767.

Continuation of N<sup>o</sup> 1. I begin the register of this year with observing, that the manure just mentioned, was an exceeding well rotted mixture of dung, cinder ashes, mortar, wash sand, earth, &c. upwards of two years old. I spread eight loads on the piece, (each 40 bushels) and having, as I before remarked, split the ridges in the intervals, and opened a furrow to lay the plants dry; it is worth observing that the fineness of the moulds, after this ploughing, the freedom of the whole piece from all manner of weeds, the deep green of the young shoots, notwithstanding the lateness of the season, altogether formed a very pleasing spectacle. The plough had turned up the manure against the little ridge on which the plants stood, so that it was very near buried, only small pieces here and there appearing between them; the furrows entirely open, and of a fineness which I scarce ever saw equalled, even in a garden. On part of one row, I drew the moulds from each side of the plants over them, forming a ridge; and should have proceeded further, but it struck me that the virtue of the manure would probably be confined better to the plants while open, as they were situated.

ated with a little ridge of moulds rising above them on each side; I therefore left the remainder as before.

May 2d, cut it, weight 21 cwt. the 4th, horse hoed it, drawing the moulds from the rows. I may remark, that the succeeding horse hoeings were every one the reverse of that which preceded; consisting of throwing a ridge in the middle of the interval, and then splitting it. June 12th, cut it a second time, weight 32 cwt. the 13th, horse hoed it; the 15th, hand hoed the rows. July 18th, cut it; weight 35 cwt. the 21st, horse hoed it; the 22d, hand hoed the rows, striking deep between the plants to loosen the soil. August 21st, cut it, weight 37 cwt. Several plants had above 100 distinct shoots, and weighed from 17 to 23 ounces; the 25th, horse hoed it. October 10th, cut it the last time, weight 21 cwt.

EXPENCES.					£.	s.	d.
Manuring,	-	-	-	-	0	14	0
Four horse hoeings,	-	-	-	-	0	1	4
Two hand hoeings,	-	-	-	-	0	3	6
Reaping five times,	-	-	-	-	0	5	0
Collecting the heaps, loading and carrying,	-	-	-	-	0	2	6
					<hr/>		
					1	6	4
Rent, &c.	-	-	-	-	0	5	8
					<hr/>		
					1	12	0

## PRODUCE.

First cutting, 21 cwt.							
Second, - 32							
Third, - 35							
Fourth, - 37							
Fifth - 21							
<hr/>					£.	s.	d.
7 ton. 6 cwt. at 7d.	-	-	-	-	4	5	2
Expences,	-	-	-	-	1	12	0
					<hr/>		
Profit, 7l. 19s. 6d. per acre,	-	-	-	-	2	13	2
					£.	s.	d.
Manuring, at 7s. 11d. the load purchased,	-	-	-	-	0	7	11
Ditto at home,	-	-	-	-	0	2	6
Horse hoeing	-	-	-	-	0	2	2
					<hr/>		
					0	11	9½
					<hr/>		
Clear profit. 6l. 4s. 0½d. per acre.	-	-	-	-	2	1	4½

## OBSERVATIONS.

The produce and profit of this year's cuttings much surprized me: for I expected from the large space allowed between plant and plant, so wisely calculated for lasting profit, as the bulb spreads, that the quantity would have been but inconsiderable. Indeed, there can be no doubt, from the nature of the plant, but in this method the product will increase every year until the rows of the plants join their bulbs, and crowd each other in the manner every shoot does in the drill way. When at a full growth, the branches of the plants met in many places, across the intervals, and appeared like a broadcast crop; and in successive years, this would have increased, I doubt not, to a surprising degree.

The few plants I earthed over the preceding winter, I thought more backward than the rest, nor had they so many stems the first crop as their neighbours. As the farmer purposed ploughing up all these experiments, I dug up several of these roots to see the effect the transplantation had had: most of them were 5, 5½, and some 6 inches in circumference: and from 6 to 12 inches long, before they forked, the branching roots spread all ways, and were two and two and half inches in circumference; I was astonished at the clusters of these roots, which hung to some of the vigorous plants.

GENERAL OBSERVATIONS ON N<sup>o</sup> 1 and 2.

The two first years of this crop must be considered as a preparation, at the expence of 6*l.* 11*s.* *per* acre; and the minute accuracy of the culture is such, that this expence cannot be thought great: so much ploughing and hoeing, a manuring, and the transplantation, all included; it is rather low, I think. The consequence, *viz.* a clear profit of 6*l.* 4*s.* *per* acre the third year is a most extraordinary return; and amply repays the expence. But the great importance of this mode of cultivating lucerne, consists in a circumstance which I am unfortunately quite unable to prove; the duration of the crop, and its increasing value. But I must observe, that the state of the plantation the third year, gave me the clearest reason imaginable, for determining, that the growth would increase greatly every year until the bulbs joined in the rows, when I should suppose the crop in perfection, and so to continue for many years: the situation of the plants will not leave us a doubt of this; the intervals two feet four inches wide, allow of horse hoeing in the utmost perfection; and the plants in the rows at one foot asunder, are most excellently adapted for keeping them perfectly and totally clean from weeds, which with lucerne, I am well convinced is an object of the utmost consequence. The hand hoes have a free and clear stroke around every plant, so that the earth cannot fail of being in a constant state of pulverization; and the men have a fair opportunity of plucking away every weed

weed and bit of grass, which the most accurate attention will not command in the drilling method. While the whole surface of the earth is kept in such perfect order, with no plant on it but the lucerne, every spoonful of manure that is laid on it, takes full effect, and must certainly advance the product to a great height. There cannot be a doubt, but several following years in such a situation, must improve the product, each turning out more profitable than the former. I have not the least idea but that the clear profit of this piece would presently have arose to 10*l.* *per* acre, had it been manured with rotten dung every year, as I designed had I continued on the farm.



## S E C T. IV.

## COMPARISON of these METHOD

**W**HEN several modes of culture are recommended for a plant, each by people strenuous for their own; it is necessary for bystanders not only to try their merit with accuracy, but also to compare them under a perfect similarity of circumstances; that the comparative degree of merit may be known, and the points wherein either of them are superior, pointed out and explained. No part of husbandry has more divided the farming world, then the enquiry into the proper mode of cultivating lucerne: and this matter possessed so much of my attention, that I should greatly have varied and increased the number of my experiments formed to decide it, had I continued longer in Suffolk. I have now the register of but one piece of ground to lay before the reader; and the duration of that is by no means sufficient to decide the point; but the exactness with which it is conducted will state the comparison as clear as possible, for the three first years. Each crop is conducted in a very spirited manner, for I thought it right to give the plant fair play in the three modes: the reader may be certain of the equality of soil and culture, from the smallness of the pieces on which the trials are made.

EXPERIMENT N<sup>o</sup> 1.

Culture, expences, and produce of three roods, in three divisions, field L\*, 1765.

## CULTURE.

These roods are part of an acre that yielded horse hoed beans in 1764, in the utmost perfection of both tillage and manure: the stubble of which was ploughed up in October, and the land water furrowed for the winter. In March gave it the first spring ploughing, and water furrowed it again:

this ploughing threw one third on to the flat, left one third on five feet ridges, and one on three feet four inch ridges. The beginning of April stirred them again, reversing the ridges, and leaving the other rood flat. The 17th, ploughed them again, arching up the five feet ridges, reversing the three feet ones, and leaving the other flat; harrowed them all twice; then drilled the five feet ridges with three rows of lucerne at one foot asunder; sowed the flat rood broadcast with 5 lb. of seed, and set a row of plants (taken up from a crop sown in 1763) one foot asunder, on the tops of the three feet four inch ridges. These operations were all performed at once: but I should remark, that this spring transplantation was quite contrary to directions; it was a thought of my own: not in expectation of better success, but merely with desire to gain time.

I have often remarked how unfavourable this summer was, from its extreme drought, to many crops; it kept backward these of lucerne, among others, but yet the land was in such excellent heart that the mischief was not so great as on soils not in equal order. Heavy rains the 9th of May insured life to the plants that had been set, and made the sown and drilled shew themselves to some advantage. The transplanted, throughout the summer, made the finest appearance; the middle of June all three roods were hand hoed over all the surface, and weeded at the same time. July 23d, cut the transplanted rood; the produce 12 cwt. 28 lb. or 2 ton. 9 cwt. *per* acre, and at 7d. *per* cwt. (an equal valuation being necessary) is 1l. 8s. 7d. After this cutting I horse hoed the rows, turning a furrow from the plants, and throwing up a small ridge in the middle of each interval. August 5th, cut the drilled, and weighing it found the produce to be 9 cwt. 17 lb. or *per* acre 1 ton 16 cwt. 68 lb. which at 7d. comes to 1l. 1s. 3d. I horse hoed the ridges after this cutting, and hand hoed the rows. The broadcast was not a full crop till the 28th of September, when it was mown; the produce 8 cwt. 71 lb. or *per* acre 1 ton 14 cwt. 60 lb. and in money 1l. 0s. 1d. October 8th, cut the transplanted a second time, 15 cwt. 42 lb. or *per* acre 3 ton. 1 cwt. 56 lb. and at 7d. is 1l. 15s. 10d.

The 18th, cut the drilled a second time; the weight 11 cwt. 24 lb. or *per* acre 2 ton. 4 cwt. 96 lb. or 1l. 6s. 2d. The crops of this year being over 1 manured each of the roods with five loads of rotten farm yard dung, and then horse hoed the drilled and transplanted ones, contrary to the last hoeing. Proportions *per* acre

ACCOUNT of the DRILLED.

EXPENCES.

	£.	s.	d.
Four ploughings,	0	4	0
1 harrowing,	0	0	41
	<hr/>		
Carried over,	0	4	41
	<hr/>		
			Brought

	£.	s.	d.
Brought over,	0	4	4½
Water furrowing,	0	1	3
Drilling,	0	0	3½
Seed,	0	6	0
Two hand hoeings,	0	8	6
Cutting twice,	0	2	0
Raking together, loading and carting,	0	3	0
Two horse hoeings,	0	1	4
	1	6	9
Rent, &c.	0	17	0
	2	3	9

## PRODUCE.

	Ton.	cwt.	lb.	£.	s.	d.
Aug. 6th, First cutting,	1	16	68	1	1	3
Oct. 18th, Second,	2	4	96	1	6	2
	4	1	52	2	7	5
Expences,				2	3	9
Profit,				0	3	8
				£.	s.	d.
Ploughing,				0	9	7
Harrowing,				0	1	1½
Drilling,				0	0	3
Horse hoeing,				0	2	0
				0	12	11½
The above profit,				0	3	8
Loss,				0	9	3½

## ACCOUNT of the TRANSPLANTED.

	£.	s.	d.
EXPENCES.			
Four ploughings,	0		0
Harrowing,	0	0	4½
Water furrowing,	0	1	3
Digging up the roots and transplanting,	1	4	0
Carried over,	1	9	7½
			Brought

	£.	s.	d.
Brought over,	1	9	7½
Two horse hoeings,	0	2	0
Two hand hoeings,	0	7	0
Reaping twice,	0	6	0
Collecting together, loading, and carting,	0	3	0
Rent, &c.	2	7	7½
	0	17	
	3	4	7½

PRODUCE.

	Ton.	cwt.	lb.	£.	s.	d.
July 23d, First cutting,	2	9	0	1	8	7
Oct. 8th, Second,	3	1	56	1	15	10
	5	10	56	3	4	5
Expences,				3	4	7½
Produce,				3	4	5
Loss,				0	0	2½
				£.	s.	d.
Ploughing,				0	9	7
Harrowing,				0	1	1½
Horse hoeing,				0	3	2½
				0	13	11
Total loss,				0	14	1½

ACCOUNT of the BROADCAST.

EXPENCES.

	£.
Four ploughings,	0 4 0
Harrowing,	0 0 4½
Water-furrowing,	0 1 3
Seed,	1 0 0
Sowing,	0 0 6
Three mowings,	0 1 0
Raking together, loading, and carting,	0 1 6
Carried over,	1 8 7½
Brought	1 8 7½

Brought over,	-	-	-	-	-	-	£.	s.	d.
Rent, &c.	-	-	-	-	-	-	1	8	7½
							0	17	0

---

 2 5 7½

## PRODUCE.

One cutting, 1 ton, 14 cwt. 60lb.	-	-	-	-	-	-	£.	s.	d.
							1	0	1

Expences,	-	-	-	-	-	-	2	5	7½
Produce,	-	-	-	-	-	-	1	0	1

Loss,	-	-	-	-	-	-	1	5	6½
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							£.	s.	d.
Ploughing,	-	-	-	-	-	-	0	9	7
Harrowing,	-	-	-	-	-	-	0	1	1½

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 0 10 8½

Total loss,	-	-	-	-	-	-	1	16	3
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## COMPARISON.

Loss by the broadcast,	-	-	-	-	-	-	1	16	3
Ditto by the transplanted,	-	-	-	-	-	-	0	14	1½

Latter superior by	-	-	-	-	-	-	1	2	1½
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Loss by the broadcast,	-	-	-	-	-	-	1	16	3
Ditto by the drilled,	-	-	-	-	-	-	0	9	3½

Latter superior by	-	-	-	-	-	-	1	6	11½
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Loss by the transplanted,	-	-	-	-	-	-	0	14	1½
Ditto by the drilled,	-	-	-	-	-	-	0	9	3½

Latter superior by	-	-	-	-	-	-	0	4	10
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## OBSERVATIONS.

This comparison, including every attendant circumstance, is decisive. We find from it, that the drilled method has the superiority the first year: without looking on to future years, it is of some consequence to know the exact progressive state of the account. The superiority of the drilled over the transplanted is owing to the smallness of the expences; the seed, in that method, not being near the cost of the labour in transplanting. It is very observable that the transplanted yields near a ton and a half more in weight than the drilled,

drilled, which proves clearly that this spring planting, though it may not in all cases be so advisable as that of August, yet is, in many, much superior; and it further proves, that roots of two or three years old are preferable to those that have been sown only six months. Not one in an hundred missed growing, notwithstanding the severity of the drought; and their second growth was remarkably luxuriant: I have not a doubt of their yielding next year an immense produce.

The broadcast is very much inferior to both the others, which is owing to the expence of the seed, and, I apprehend, to the drought affecting the plants when thick and promiscuous, more than when much of the surface is in tillage.

EXPERIMENT, N<sup>o</sup> 2.

Culture, expences, and produce of three roods, 1766.

## CULTURE.

Continuation of N<sup>o</sup> 1. The excellent preparation these roods received in 1764, together with the hoeings of two roods, and the manuring last autumn of all three, made the lucerne shoot out very early and luxuriantly, in the spring of this year. The uncommonly fine weather the first eighteen days of March, advanced the growth prodigiously, insomuch that the transplanted rood was a full crop, ready to cut, the 26th of April, having the start much of both the others. It produced 15 cwt. 15 lb. or *per* acre 3 ton. 60 lb. and at 7d. amounts to *1l.* 15s. 3d. Horse hoed the ridges after this cutting, and also hand hoed and weeded the rows, leaving the whole surface in most perfect garden-like order.

The drilled rood was cut the 10th of May; produce 13 cwt. 80 lb. or *per* acre 2 ton. 14 cwt. 96 lb. and at 7d. is *1l.* 11s. 10d. Horse hoed the ridges, and hand hoed and hand weeded the rows.

May 24th, cut the broadcast; the weight 19 cwt. 57 lb. or *per* acre 3 ton. 18 cwt. 4 lb. at 7d. is *2l.* 5s. 6d. harrowed it directly with four horses. May 28th, cut the transplanted the second time; produce 19 cwt. 39 lb. *per* acre it is 3 ton. 17 cwt. 14 lb. at 7d. is *2l.* 5s. horse and hand hoed.

June 23d, cut the drilled again; produce 19 cwt. 74 lb. or *per* acre 3 ton. 18 cwt. 72 lb. at 7d. is *2l.* 5s. 10d. Horse and hand hoed again.

July 11th, cut the transplanted for the third time; the produce 17 cwt. 102 lb. or *per* acre 3 ton. 11 cwt. 82 lb. and at 7d. comes to *2l.* 1s. 9d. Horse-hoed.

• The 25th, cut the broadcast the second time; the weight 18 cwt. 56 lb. or *per* acre 3 ton. 14 cwt. 2 lb. at 7d. it is *2l.* 1s. 2d.

July

July 30th, was the third cutting of the drilled; the weight 24cwt. 15lb. or *per acre*, 4ton. 16cwt. 60lb. and at 7*d.* is 2*l.* 16*s.* 3*d.* Horse hoed the ridges after this cutting.

August 19th, reaped the transplanted the fourth time; the weight 14cwt. or *per acre* 2ton. 16cwt. at 7*d.* is 1*l.* 12*s.* 8*d.* horse hoed.

September 29th, cut the drilled the fourth time; a full crop of 26cwt. 58lb. or *per acre* 5ton. 6cwt. 8lb. at 7*d.* is 3*l.* 1*s.* 10*d.* horse hoed after this cutting and also hand hoed and weeded. The same day cut the transplanted the fifth time; produce 11cwt. or *per acre* 2ton. 4cwt. and at 7*d.* is 1*l.* 5*s.* 8*d.* Horse and hand hoed, and weeded the rows. October 3d, mowed the broad-cast; the weight 14cwt. 33lb. or *per acre* 2ton. 17cwt. 22lb. and at 7*d.* is 1*l.* 13*s.* 3*d.*

## ACCOUNT of the DRILLED.

EXPENCES.						£.	s.	d.
Manuring,	-	-	-	-	-	0	9	0
Water furrowing,	-	-	-	-	-	0	0	4
Cutting four times,	-	-	-	-	-	0	4	0
Raking together, loading and carting,	-	-	-	-	-	0	6	0
Four horse hoeings,	-	-	-	-	-	0	2	8
Three hand hoeings, &c.	-	-	-	-	-	0	9	0
						<hr/>		
Rent,	-	-	-	-	-	1	11	0
						0	17	0
						<hr/>		
						2	8	0

## PRODUCE.

	Ton.	cwt.	lb.	£.	s.	d.
May 10th, First cutting,	2	14	96	1	11	10
June 23d, Second ditto,	3	18	72	2	5	10
July 30th, Third ditto,	4	16	60	2	16	3
Sept. 29th, Fourth ditto,	5	6	8	3	1	10
<hr/>				<hr/>		
Expences,	16	16	12	9	15	9
				2	8	0
				<hr/>		
Profit,	-	-	-	7	7	9
				£.	s.	d.
Manuring,	-	-	-	0	12	6
Horse hoeing,	-	-	-	0	4	0
				<hr/>		
				0	16	6
				<hr/>		
Clear profit,	-	-	-	6	11	

ACCOUNT of the TRANSPLANTED.

EXPENCES.							£.	s.	d.
Manuring,	-	-	-	-	-	-	0	9	0
Water furrowing,	-	-	-	-	-	-	0	0	4
Reaping five times,	-	-	-	-	-	-	0	15	0
Collecting together, loading, and carting,	-	-	-	-	-	-	0	7	6
Five horse hoeings,	-	-	-	-	-	-	0	5	0
Three hand hoeings, &c.	-	-	-	-	-	-	0	7	6
							<hr/>		
Rent, &c.	-	-	-	-	-	-	2	4	4
							0	17	0
							<hr/>		
							3	1	4

PRODUCE.

Ton. cwt. lb.							£.	s.	d.
April 26th, First cutting,	-	-	3	0	60	-	1	15	0
May 28th, Second ditto,	-	-	3	17	14	-	2	5	0
July 11th, Third ditto,	-	-	3	11	82	-	2	1	9
Aug. 19th, Fourth ditto,	-	-	2	16	0	-	1	12	8
Sept. 29th, Fifth ditto,	-	-	2	4	0	-	1	5	8
<hr/>							<hr/>		
15 9 44							9	0	4
Expences,	-	-	-	-	-	-	3	1	4
							<hr/>		
Profit,	-	-	-	-	-	-	5	19	0
							<hr/>		
Manuring,	-	-	-	-	-	-	0	12	6
Horse hoeing,	-	-	-	-	-	-	0	8	1½
							<hr/>		
							0 7½		
Clear profit,	-	-	-	-	-	-	4	18	4½

ACCOUNT of the BROADCAST.

EXPENCES.							£.	s.	d.
Manuring,	-	-	-	-	-	-	0	9	0
Water furrowing,	-	-	-	-	-	-	0	0	4
Mowing thrice,	-	-	-	-	-	-	0	3	0
Raking together, loading, and carrying,	-	-	-	-	-	-	0	4	6
Harrowing,	-	-	-	-	-	-	0	2	0
							<hr/>		
Carried over,	-	-	-	-	-	-	0	18	10
							<hr/>		
							Brought		



		£.	s.	d.
Brought over,	- - - - -	0	18	10
Rent,	- - - - -	0	17	0
		<u>1</u>	<u>15</u>	<u>10</u>

## PRODUCE.

	Ton. cwt. lb.	£.	s.	d.
May 24th, First cutting,	- 3 18 4	2	5	6
July 25th, Second ditto,	- 3 14 82	2	1	2
Oct. 3d, Third ditto,	- 2 17 22	1	13	3
	<u>10 9 108</u>	<u>5</u>	<u>19</u>	<u>11</u>
Expences,	- - - - -	1	15	10
Profit,	- - - - -	4	4	1
		£.	s.	d.
Manuring,	- - - - -	0	12	6
Harrowing,	- - - - -	0	5	0
		<u>0</u>	<u>17</u>	<u>6</u>
Clear profit,	- - - - -	3	6	7

## COMPARISON.

	£.	s.	d.
Profit by the drilled,	6	11	3
Ditto by the transplanted,	4	18	4
Superiority of the former,	<u>1</u>	<u>12</u>	<u>10</u>
Profit by the drilled,	6	11	3
Ditto by the broadcast,	3	6	7
Former superior by	<u>3</u>	<u>4</u>	<u>8</u>
Profit by the transplanted,	4	18	4
Ditto by the broadcast,	3	6	7
Former superior by	<u>1</u>	<u>11</u>	<u>0</u>

## OBSERVATIONS.

The drilled is this year much superior to both the other methods, which might easily be expected; for the three rows on a five feet ridge are in proportion to equally distant at twenty inches asunder, in which method the land is consequently much better stocked with plants, and at the same time the crop has the

the advantage of horse hoeings; though not in such full perfection as single rows. These circumstances one might easily suppose would ensure to this mode of drilling the superiority for several years, probably until the plants in the rows suffered from their thickness, when the transplanted crop, from the space allowed each plant, would prove in the highest perfection; that is, when the bulbs join in the rows, and the number of shoots from each becomes a balance to the number of the plants in the drilled rows. And this I should suppose must have been one principal reason for introducing the culture by transplantation, and not in expectation that the advantages of it would shew themselves the first years of the crop. As to the broadcast, though it is a very profitable crop of itself only considered, yet it figures not with either of the other methods.

Near 5*l.* per acre profit the second year of transplanted lucerne, is, I think very considerable, and shews clearly that the planting old roots is a practice by no means to be condemned.

EXPERIMENT, N<sup>o</sup> 3.

Culture, expences, and produce, of three roods, 1767.

## CULTURE.

N<sup>o</sup> 2. continued. The cuttings of this were as follows, on each of the three roods.

## DRILLED.

May 6th, Produce 15 cwt. 18 lb. or per acre, 3 ton. 72 lb. at 7*d.* is 1*l.* 15*s.* 4*d.*

June 15th, Produce 23 cwt. 82 lb. or per acre 4 ton. 14 cwt. 104 lb. at 7*d.* is 2*l.* 15*s.* 5*d.*

July 25th, Produce 28 cwt. or per acre 5 ton. 12 cwt. at 7*d.* is 3*l.* 5*s.* 4*d.*

August 29th, Produce 29 cwt. 14 lb. or per acre 5 ton. 16 cwt. 56 lb. at 7*d.* is 3*l.* 7*s.* 11*d.*

October 3d, Produce 1 ton, or per acre 4 ton. at 7*d.* is 2*l.* 6*s.* 8*d.*

Horse hoed four times, and hand hoed and weeded thrice.

## TRANSPLANTED.

April 28th, Produce 16 cwt. 14 lb. or per acre 3 ton. 4 cwt. 56 lb. at 7*d.* is 1*l.* 17*s.* 4*d.*

June 2d, Produce 1 ton, or per acre 4 ton. at 7*d.* is 2*l.* 6*s.* 8*d.*

July 6th, Produce 19 cwt. 17 lb. or per acre 3 ton. 16 cwt. 68 lb. at 7*d.* is 2*l.* 4*s.* 7*d.*

August 8th, Produce 16 cwt. or per acre 3 ton. 4 cwt. at 7*d.* is 1*l.* 17*s.* 4*d.*

September 11th, Produce 11 cwt. 3 lb. or per acre 2 ton. 4 cwt. 12 lb. at 7*d.* is 1*l.* 5*s.* 8*d.*

October 9th, Produce 7 cwt. or *per* acre 1 ton, 8 cwt. at 7*d.* is 16*s.* 4*d.*

Five horse and three hand hoeings.

## BROADCAST.

May 22d, Produce 18 cwt. or *per* acre 3 ton. 12 cwt. at 7*d.* is 2*l.* 2*s.*

July 17th, Produce 25 cwt. 17 lb. or *per* acre 5 ton. 68 lb. at 7*d.* is 2*l.* 18*s.* 7*d.*

September 25th, Produce 16 cwt. 14 lb. or *per* acre 3 ton. 4 cwt. 56 lb. at 7*d.* is 1*l.* 17*s.* 7*d.*

Once harrowed.

## ACCOUNT of the DRILLED.

## EXPENCES.

	£.	s.	d.
Water furrowing,	0	0	4
Cutting five times,	0	5	0
Raking together, carting, and loading,	0	7	6
Four horse hoeings,	0	2	8
Three hand hoeings,	0	9	0
	1	4	6
Rent, &c.	0	17	0
	2	1	6

## PRODUCE.

	Ton.	cwt.	lb.	£.	s.	d.
First cutting,	3	0	72	1	15	4
Second,	4	14	104	2	15	5
Third,	5	12	0	3	5	4
Fourth,	5	16	56	3	7	11
Fifth,	4	0	0	2	6	8
	23	4	3	13	10	8
Expences,				2	1	6
Profit,				11	9	2
Horsehoeing,				0	4	0
Clear profit,				11	5	2

## ACCOUNT of the TRANSPLANTED.

## EXPENCES.

	£.	s.	d.
Water furrowing,	0	0	4
Reaping six times,	0	18	0
Carried over,	0	18	4

	£.	s.	d.
Brought over,	0	18	4
Collecting together, loading and carting,	0	9	0
Five horse hoeings,	0	5	0
Three hand hoeings,	0	7	6
	<hr/>		
	1	19	10
Rent, &c.	0	17	0
	<hr/>		
	2	16	10
	<hr/>		

## PRODUCE.

	Ton.	cwt.	lb.	£.	s.	d.
First cutting,	3	4	56	1	17	4
Second,	4	0	0	2	6	8
Third,	3	16	68	2	4	7
Fourth,	3	4	0	1	17	4
Fifth,	2	4	12	1	5	8
Sixth,	1	8	0	0	16	4
	<hr/>					
	17	17	24	10	7	11
Expences,				2	16	10
	<hr/>					
Profit,				7	11	1
Horse hoeing,				0	7	11½
	<hr/>					
Clear profit,				7	3	2½
	<hr/>					

## ACCOUNT of the BROADCAST.

	£.	s.	d.
Water furrowing,	0	0	3
Mowing thrice,	0	3	0
Harrowing,	0	2	0
Raking together, loading, and carting,	0	4	6
	<hr/>		
	0	9	9
Rent, &c.	0	17	0
	<hr/>		
	1	6	9
	<hr/>		

## PRODUCE.

	Ton.	cwt.	lb.	£.	s.	d.
First cutting, - - - -	0	12	0	2	2	0
Second, - - - -	5	0	68	2	18	7
Third, - - - -	3	4	56	1	17	7
	11	17	12	6	18	2
Expences, - - - -				1	6	9
Profit, - - - -				5	11	5
Harrowing, - - - -				0	5	0
Clear profit, - - - -				5	6	5

## COMPARISON.

	£.	s.	d.
Profit by the drilled, - - - -	11	5	2
Ditto by the transplanted, - - - -	7	3	2½
Former superior by - - - -	4	1	11½
Profit by the drilled, - - - -	11	5	2
Ditto by the broadcast, - - - -	5	6	3
Former superior by - - - -	5	18	11
Profit by the transplanted, - - - -	1	5	2½
Ditto by the broadcast, - - - -	5	6	3
Former superior by - - - -	1	16	11½

## OBSERVATIONS.

The drilled yet maintains a great superiority, at which I am not surprized, for the reasons I before gave, *viz.* the rows not being too much crouded for several years after the drilling, and the rows of the transplanted not being full stocked for several years ; neither of them undoubtedly are yet come to perfection. The broadcast is very profitable, though not equal to the others.\*

Respecting the state of each rood at the end of this year, I must observe that the broadcast shews numerous signs of a decline, particularly in the weeds that had feated themselves : the annual harrowing will by no means extirpate them, unless it is repeated so often as to ruin the lucerne as well as its enemies. Much natural grafs was to be seen, and many other weeds. Now I am well assured, from repeated observation, that lucerne and weeds are incompatible : if you cannot keep it clean, you will not keep it with profit. Two years more are the utmost that this crop would last in any profit.

The

The drilled is in as fine a state as can be wished; not yet in perfection, but advancing gradually to it, and offering the greatest reason for supposing it will continue in perfection for many years. Not a weed in the root.

The transplanted, one of the most beautiful crops in the world; the pleasing regularity of the rows—every plant distinct from a fine bed of garden mould—and in four and twenty hours after cutting, exhibiting an amazing number of young shoots, of the most elegant verdure: if ever a culture deserved the name of *garden*, it is this. As to duration, it would be some years before it came to perfection, and from the space allowed the plants, would probably last for an age: certainly longer than the drilled; at least there is all the reason in the world to conjecture it, from the superior tillage it receives; and if the roots of lucerne ever penetrate, on this soil, so deep as to damage the plants, it will therein have the advantage; for the amputation makes them spread horizontally in many fibres, instead of perpendicularly in one large tap root.

#### GENERAL OBSERVATIONS

It is not without the greatest regret that I conclude this experiment. The nature of the plant demanded perhaps twenty years continuance of it; for probably so long both drilling and transplanting would have continued in full perfection, and the merit of each mode would then have been clear, without dependance on duration. Nor would the broadcast experiment have been presently decided; for I should have carefully extirpated all weeds but natural grasses, and left them with the lucerne for a natural pasture: I am not at all clear that it would have been a bad one. But as I leave the farm this trial is at an end; we can therefore only speak decisively on the three first years of lucerne in these modes of culture, and conjecture the result in future. This is not what I intended, but the accurate comparison even of three years, is more than the world has yet received. It is first necessary to draw the result into one view.

#### EXPENCES.

DRILLED.										£.	s.	d.
1765	-	-	-	-	-	-	-	-	-	2	16	8½
1766	-	-	-	-	-	-	-	-	-	3	4	6
1767	-	-	-	-	-	-	-	-	-	2	5	6
										8	6	8½
Average, 2 <i>l.</i> 15 <i>s.</i> 6½ <i>d.</i>												

BROAD-

TRANSPLANTED.						£.	s.	d.
1765	-	-	-	-	-	3	18	6½
1766	-	-	-	-	-	4	1	11½
1767	-	-	-	-	-	3	4	9½
Average, 3 <i>l.</i> 15 <i>s.</i> 1 <i>d.</i>						11	5	3½
BROADCAST.						£.	s.	d.
1765	-	-	-	-	-	2	16	4
1766	-	-	-	-	-	2	13	4
1767	-	-	-	-	-	1	11	9
Average, 2 <i>l.</i> 7 <i>s.</i> 1½ <i>d.</i>						7	1	5
						£.	s.	d.
Transplanted,	-	-	-	-	-	11	5	3½
Drilled,	-	-	-	-	-	8	6	8½
Excess of the former,	-	-	-	-	-	2	18	7
Transplanted,	-	-	-	-	-	11	5	3½
Broadcast,	-	-	-	-	-	7	1	5
Excess of the former,	-	-	-	-	-	4	3	10½
Drilled,	-	-	-	-	-	8	6	8½
Broadcast,	-	-	-	-	-	7	1	5
Excess of the former,	-	-	-	-	-	1	5	3½

It from hence very clearly appears that the transplanting method is much the most expensive the three first years: it is also the most expensive in the regular course, which appears by the expence of 1767. the drilled is the next in expence, and the broadcast the last: The total of the three years, runs high with the latter, but its regular annual charge is low. The transplanting exceeding the drilled by 2*l.* 18*s.* 7*d.* is not so great an excess as to become a strong objection to the mode: for it is practised with a view to a superior duration, and it must be evident that if the end is answered, such a price for it is not a dear one, but on the other hand it is with the superior annual expence an heavy objection if the drilled crop keeps for much a head.

PRODUCT.

## PRODUCT,

## DRILLED.

			Ton. cwt. lb.					<i>l.</i>	<i>s.</i>	<i>d.</i>
1765	-	-	4	1	52	-	-	2	7	5
1766	-	-	16	16	12	-	-	9	13	9
1767	-	-	23	4	8	-	-	13	10	8
			<hr/>					<hr/>		
			44	1	72	-	-	25	13	10
			<hr/>					<hr/>		
Average,	-	-	14	13	98	-	-	8	11	3
			<hr/>					<hr/>		

## TRANSPLANTED.

			Ton. cwt. lb.					<i>l.</i>	<i>s.</i>	<i>d.</i>
1765	-	-	5	10	56	-	-	3	4	5
1766	-	-	15	9	44	-	-	9	0	4
1767	-	-	17	17	24	-	-	10	7	11
			<hr/>					<hr/>		
			38	17	12	-	-	22	12	8
			<hr/>					<hr/>		
Average,	-	-	12	19	4	-	-	7	10	10
			<hr/>					<hr/>		

## BROADCAST.

			Ton. cwt. lb.					<i>l.</i>	<i>s.</i>	<i>d.</i>
1765	-	-	1	14	60	-	-	1	0	1
1766	-	-	10	9	108	-	-	5	19	11
1767	-	-	11	17	12	-	-	6	18	2
			<hr/>					<hr/>		
			24	1	68	-	-	13	18	2
			<hr/>					<hr/>		
Average,	-	-	8	0	60	-	-	4	12	8
			<hr/>					<hr/>		
Drilled,	-	-	44	1	72	-	-	25	13	10
Transplanted,	-	-	38	17	12	-	-	22	12	8
			<hr/>					<hr/>		
Superiority,	-	-	5	4	60	-	-	3	1	2
			<hr/>					<hr/>		
Drilled,	-	-	44	1	72	-	-	25	13	10
Broadcast,	-	-	24	1	68	-	-	13	18	2
			<hr/>					<hr/>		
Superiority,	-	-	20	0	4	-	-	11	15	8
			<hr/>					<hr/>		

Transplanted



		Ton. cwt. lb.					£.	s.	d	
Transplanted,	-	-	38	17	12	-	-	22	12	8
Broadcast,	-	-	24	1	68	-	-	13	18	2
		<hr/>								
Superiority,	-	-	14	15	56	-	-	8	14	6
		<hr/>								

The profit and the product of a crop sometimes vary, for expences may force a superior product, so that the best crop in quantity may be the worst in profit; and sometimes when this is the case there is reason to reflect on the nature of the culture, to discover if the genius of the plant cannot be consulted at a less expence: But whether these circumstances agree or oppose, still the product should always meet with particular attention, for it certainly marks when the treatment of several modes is similar, which is most consonant to the nature of the plant.

I am rather surprized that the drilled should not exceed the transplanted in a greater degree, considering that the peculiar advantages of the latter method are not in full play of some years, and that the drilled is in proportion of single rows, at twenty inches instead of three feet four. I should have expected that the drilled at those distances would have produced a much greater quantity than the transplanted; but the reason must be that the plants of the latter were of a greater age than those of the drilled, and consequently produced much more than others of only six months or a year would have done: the superiority of the drilled I should conjecture would continue until the crop was past its perfection; whenever that happened. I apprehend the transplanted would then exceed it: but herein as I am without experiment to decide, I can only offer an opinion.

Were I in future to transplant lucerne, not for the sake of experiment but profit, I should chuse the distances here used in drilling; three rows at one foot on five feet ridges; in which mode I have little doubt but the advantages in favour of that culture would come vastly sooner into play, than by the equally distant ones at three feet four inches.

The product of the broadcast is so much inferior to that of both the other methods that it sufficiently proves the culture to be less adapted to the nature of the plant.

In respect to the progress of the crops, the drilled has a great advantage: the increase from 1766 to 1767 is pretty nearly *an half*; of the transplanted it is about *a seventh*; and of the broadcast only *a tenth*. This is remarkable; the plants of the transplanted being so much older than those of the drilled, must be the occasion of the difference between them, and the great inferiority of the broadcast culture, suffering the natural grass to arise, the reason of that increase being so small.

## PROFIT.

## DRILLED.

						£.	s.	d.
1766	-	-	-	-	-	0	11	3
1767	-	-	-	-	-	11	5	2
						<hr/>		
1765 Loss,	-	-	-	-	-	17	16	5
Clear,	-	-	-	-	-	0	9	3½
						<hr/>		
Average, 5l. 15s. 8d.						17	7	1½

## TRANSPLANTED.

						£.	s.	d.
1766	-	-	-	-	-	4	18	4½
1767	-	-	-	-	-	7	3	2½
						<hr/>		
1765 Loss,	-	-	-	-	-	12	1	7
Clear,	-	-	-	-	-	0	14	1½
						<hr/>		
Average, 3l. 15s. 9d.						11	7	5½

## BROADCAST.

						£.	s.	d.
1766	-	-	-	-	-	3	6	7
1767	-	-	-	-	-	5	6	5
						<hr/>		
1765 Loss,	-	-	-	-	-	8	13	0
Clear,	-	-	-	-	-	1	16	3
						<hr/>		
Average, 2l. 5s. 7d.						6	16	9
						<hr/>		
Drilled,	-	-	-	-	-	17	7	13
Transplanted,	-	-	-	-	-	11	7	5½
						<hr/>		
Former superior by	-	-	-	-	-	5	19	8
						<hr/>		
Drilled,	-	-	-	-	-	17	7	13
Broadcast,	-	-	-	-	-	6	16	9
						<hr/>		
Former superior by	-	-	-	-	-	10	10	4½

	£.	s.	d.
Transplanted,	-	-	-
Broadcast,	-	-	-
Former superior by	-	-	-
	11	7	5½
	6	16	9
	4	10	8½

As the balance of this article of profit falls on the same side as we have found that of product, it demands the greater attention. It shews the real state of the comparison, all disadvantages deducted, and all favourable circumstances carried to account. We find the drilled superior to the transplanted the first three years, by *6l. per acre*; so great a balance that we cannot for a moment avoid allowing its superior merit. But at the same time that I make this observation, let me once more remind the reader that these experiments, from the shortness of the term, do not fully decide the comparison on three accounts. *First*, The transplantation was thought of more perhaps for the sake of a secure duration, than any other circumstance; and there certainly is a strong probability that lucerne in that culture will last longer than when drilled. *Secondly*, If the idea be true, that this plant suffers from its roots penetrating too deep in some soils, then the amputation will prove of superior importance: I have no signs however of this being the case on my land. *Thirdly*, The drilled crop, it is apprehended, is nearer perfection in the third year than this transplanted one. And further, in addition to these circumstances, I must in general remark, that these experiments are not comparisons at large between drilling and transplanting: but only between drilling three rows on five feet ridges, and transplanting single rows on three feet ones. The former turns out evidently superior in every article, but I apprehend the same superiority would not have been found, had the transplanted rows been at the same distances.

I shall, upon the whole, venture to recommend this mode of drilling, as superior to transplanting at equally distant rows of three feet four inches, and to the broadcast culture. And also such method of transplantation as far beyond the broadcast sowing.

## C H A P. IV.

## O F S A I N F O I N E.

**P**REVIOUS to my inserting the experiments I have made on this grass, I must inform the reader, that I left the farm almost at the time that I was ripening hints into experience; this grass is no where commonly cultivated on such soils as mine, but as I thought it promised great advantages, I designed the culture over several large fields; and to discover how far the idea was prudent, I began with small experiments; these I am now about to lay before the reader, not as a complete treatise on the subject, but to give him that degree of experimental truth, for which I formed the trials. He may read volumes on sainfoine, as on all other subjects in husbandry, but in my own business, I did not think it adviseable to try the culture in large, until I had gained more experience than books would give me; how far these trials will be admitted as a parallel assistant to ensuing cultivators on the same soil, cannot at present be determined; I can only say, they will at least be to others more than other books have been to me.

EXPERIMENT, N<sup>o</sup> I.

Culture, expences, and produce of ten square perches, broadcast, field M\*, 1765.

## CULTURE.

Fallowed in 1763 for turnips; which crop was fed on the land in January 1764. In March ploughed it up, and sired it twice more in April; upon the last of which ploughings, harrowed in barley in the proportion of three bushels *per* acre, and also sainfoine, at the rate of four bushels *per* acre. Throughout the barley season the grass made no figure; I could

scarcely discover it, and after the former was mown, only here and there a plant of sainfoine could be seen. It was the latter end of March 1765 before it made any regular appearance: I then found it would be a crop; the plants appeared in tolerable number, and of a good countenance. I let it stand for hay, and although the dry weather of the year 1765 was very averse to most grasses, and especially those that were young; yet this crop came on tolerably. The last week in April it was very carefully cleaned of weeds, by hand weeding, with the occasional use of small hand hoes at the same time. The latter end of June I mowed it for hay, of which it yielded 1 cwt. 28lb. or *per* acre, 1 ton. It is recommended by the writers on husbandry, to feed the second crop of sainfoine; but I first thought of its culture for the purpose of raising large quantities of hay; and therefore determined to make it a rule to mow it twice a year; but the extreme drought this year prevented my making the trial; for the second growth did not rise to a height proper for cutting; I therefore had the after-grass valued the end of September; and it was valued at 6s. an acre. The proportions are as follow:

EXPENCES.						£.	s.	d.
Seed,	-	-	-	-	-	0	10	0
Weeding,	-	-	-	-	-	0	12	0
Mowing,	-	-	-	-	-	0	1	0
Making, carting, stacking, &c.	-	-	-	-	-	0	2	6
						1	5	6
Rent, &c.	-	-	-	-	-	0	17	0
						2	2	6
PRODUCE.						£.	s.	d.
One ton of hay,	-	-	-	-	-	2	15	0
After-grass,	-	-	-	-	-	0	6	0
						3	1	0
Expences,	-	-	-	-	-	2	2	6
						0	18	6
Profit,	-	-	-	-	-	0	0	10
Carting,	-	-	-	-	-	0	0	10
						0	17	8
Clear profit,	-	-	-	-	-	0	17	8

OBSERVATIONS.

The success of this crop I think very great, considering the season was so unfavourable. Great things should not be expected of sainfoine the first year; for, from all accounts, it does not come to perfection of several, which may be easily conjectured, from its generally lasting near twenty years. Common hay sold this year at 50s. but I value the sainfoine at 5s. more; which I find, from information, is a moderate allowance.

EXPERIMENT, N<sup>o</sup> 2.

Culture, expences, and produce of ten perches, 1766.

A continuation of N<sup>o</sup> 1. The crop sprouted very early in the spring; and growing with much luxuriance, was ready to mow the last week in June, a full and very fine crop, which produced of hay 3 cwt. or *per* acre 2 tons, 8 cwt. It arose again with much luxuriance, inasmuch that I mowed it again the latter end of August; the produce in hay of which mowing was 2 cwt. 40 lb. or *per* acre 1 ton, 17 cwt. 80 lb.

EXPENCES.

	£.	s.	d.
Twice mowing, - - - - -	0	2	4
Making, &c. &c. - - - - -	0	7	0
	<hr/>		
	0	9	4
Rent, &c. - - - - -	0	17	0
	<hr/>		
	1	6	4

PRODUCE.

	Ton.	cwt.	lb.		£.	s.	d.
First cutting, - - - - -	2	8	0	at 45s. - - -	5	8	0
Second, - - - - -	1	17	80	ditto - - -	4	5	3
	<hr/>				<hr/>		
	4	5	80	- - -	9	13	3
Expences. - - - - -	-	-	-	- - -	1	6	4
	<hr/>				<hr/>		
Profit, - - - - -	-	-	-	- - -	8	6	11
Carting, - - - - -	-	-	-	- - -	0	1	8
	<hr/>				<hr/>		
Clear profit, - - - - -	-	-	-	- - -	8	5	3

## OBSERVATIONS.

This success I think is very great, and turns the land to as beneficial an account as any man can desire, considering the lowness of the expence, and the simplicity of the culture. The quantity of hay produced, much exceeds clover, and the circumstance of the crop lasting many years, is of admirable importance.

EXPERIMENT N<sup>o</sup> 3.

Culture, expences, and produce of ten perches, 1767.

## CULTURE.

No 2, continued. The sainfoine was not a full crop ready for mowing this year until the 23d of June, when it was mown; the weight in hay 3 cwt, 56 lb. or *per* acre, 2 tons, 16 cwt. The second crop was cut September 4th, and amounted to 2 cwt. or *per* acre, 1 ton 12 cwt.

## EXPENCES.

Twice mowing,  
Making, &c, &c.

£. s. d.

0 2 4

0 8 9

0 11 1

0 17 0

1 8 1

Rent, &c.

## PRODUCE.

Ton. cwt. lb.

First cutting, - - 2 16 0

Second, - - - 1 12 0

£. s.

4 8 0 at 42s.

9 4 8

Expences,

1 8 1

Profit,

7 16 7

Carting,

0 1 8

Clear Profit,

7 14 11

OBSERVA-

## OBSERVATIONS.

This is a very noble profit, and shews plainly, that sainfoine is extremely well adapted to these gravelly loams: I know not of any husbandry that would give near this profit with so little trouble. The success attending the mowing twice, is a circumstance of much importance, for to many persons, hay is of a much greater proportionate value, than green feed.

## GENERAL OBSERVATIONS.

A transient view of the result of these experiments will shew, in the clearest manner, how valuable this culture is,

						Ton. cwt. lb.
Product the first year,	-	-	-	-	-	1 0 0
Second,	-	-	-	-	-	4 5 80
Third,	-	-	-	-	-	4 8 0
						<hr/> 9 13 80
Average, 3 ton. 4 cwt. 64 lb..	-	-	-	-	-	<hr/>
						£. s. d.
Profit the first year,	-	-	-	-	-	0 17 8
Second,	-	-	-	-	-	8 5 9
Third,	-	-	-	-	-	7 14 11
						<hr/> 16 17 10
Average, 5 <i>l.</i> 12 <i>s.</i> 7 <i>d.</i>						

The product of above 9 tons of hay the three first years; yielding a clear profit of 16*l.* 17*s.* 10*d.* is a degree of advantage which I apprehend can be equalled by no other grass mown for hay: and renders sainfoine an object of the utmost importance on these gravels, although there is no under stratum of rock to stop its roots from penetrating deep into the soil, which is a requisite many writers insist upon as absolutely necessary, but that it is a vulgar error is evident from this crop, for I found by searching for some roots in the autumn of 1767, that they had run to such a depth that it was impossible to follow them. In this respect sainfoine is like lucerne; nor can I see the probability that the latter should not want any such strata, but should be necessary to the former. From the largeness of these crops, I do not apprehend any soil to be better adapted to sainfoine than these gravelly



gravelly loams: they are fine, light, found, turnip gravels, rich enough to yield good crops of that root without dung, and also to produce fine ones of wheat when sown on a clover lay; I am thus particular for the sake of those who possess fields of such gravel, and more in quantity than they want for a common turnip course, without cultivating sainfoine. Let them by all means try this culture; they will most assuredly find it to answer incomparably.

Another common notion concerning this grass, is the impropriety of mowing it more than once in a year: *You may cut lucerne five or six times in a summer without damage, but if you cut sainfoine twice, you spoil it.* This sounded very improbable to me: the cutting it for hay alters not the growth in the least; if cattle are turned in to eat of the after-grass, the crop is kept down, but the growth is undoubtedly the same; and where is the difference between being cut five or six times by cattle's teeth, or once by the scythe? I will venture to pronounce this matter a mere vulgar error; and the evidence of the crop in question greatly strengthens the opinion; for not a plant in it shews the least sign of receiving damage from this practice. If land is fed, it receives the dung and urine of the cattle; but it receives it in such an irregular manner, that I am clear, the benefit does not equal the mischief done by treading, tearing and bruising the plants, instead of the clean work made by the scythe.

These experiments, upon the whole, are so extremely favourable to the culture of sainfoine on this soil, that had I staid on the farm, I should most assuredly have extended the crops to several whole fields nor shall I on any other omit trying it on all gravels, in hope of meeting with an advantage, if not equal to this, at least more considerable than common husbandry will yield.

#### EXPERIMENT, N<sup>o</sup> 4.

Culture, expences, and produce of ten square perches, field L\*, 1765.

#### CULTURE.

These perches are part of a piece that yielded beans in 1764, that were kept perfectly clean by horse and hand hoeing: the land was ploughed in autumn, on to the ridge; to dry for winter. The soil of this field being a clayey loam, and wet, I did not determine to try sainfoine in expectation of great or lasting crops, because all the writers I had consulted, asserted, that it would

would at no rate do on such land: but I did it to discover in what degree they were right: and to satisfy myself experimentally, of a merely asserted fact. In March 1765, I ploughed down the ridges, and gave it two more earths in April, upon the latter of which I harrowed in the fainsoine without corn, in the proportion of four bushels *per* acre. The young plants made their appearance in May; but the following season proved so severe a drought, that their growth was greatly checked: I repented the not sowing with corn, which would certainly have afforded shade to the young fainsoine. The latter end of June I weeded it. The continuance of the drought prevented the crop rising enough to mow until the beginning of September, when it was cut, and the produce being made into hay, weighed 80lb. or near 12 cwt. *per* acre: which is inconsiderable; but then the drought should be remembered, which almost burnt up most grasses. And all that were young. Proportion *per* acre.

EXPENCES.						£.	s.	d.
Three ploughings,	-	-	-	-	-	0	3	0
Three harrowings,	-	-	-	-	-	0	0	4½
Seed,	-	-	-	-	-	0	10	0
Sowing,	-	-	-	-	-	0	0	3
Waterfurrowing,	-	-	-	-	-	0	0	4
Weeding,	-	-	-	-	-	0	10	0
Mowing, &c.	-	-	-	-	-	0	1	0
Making, &c.	-	-	-	-	-	0	1	8
						<hr/>		
						1	6	7½
Rent,	-	-	-	-	-	0	17	0
						<hr/>		
						2	3	7½

PRODUCE.						£.	s.	d.
12cwt. of hay, at 2s. 9d.	-	-	-	-	-	1	13	0
						<hr/>		
Expences,	-	-	-	-	-	2	3	7½
Produce,	-	-	-	-	-	1	13	0
						<hr/>		
Loss,	-	-	-	-	-	0	10	7½
						<hr/>		
Ploughing,	-	-	-	-	-	0	3	0
Harrowing,	-	-	-	-	-	0	1	1½
Carting,	-	-	-	-	-	0	0	10
						<hr/>		
						0	4	11½
Total loss,	-	-	-	-	-	0	15	7

## OBSERVATIONS.

The season considered I do not think this loss is so great as might have been expected. Sainfoine is certainly some years before it comes to perfection, so that the first cannot be expected to answer: but I apprehend a great error was committed in this case, which was the not sowing with corn: a variation that would have been attended with different effects. It might have shaded the young sainfoine and therefore have been of service to it: it certainly would have altered the account of expences, for the tillage would then have belonged to the corn account, and the grass at the same time, gain a year in age before an account is taken of it, which could not fail of rendering it more profitable the first year.

EXPERIMENT, N<sup>o</sup> 5.

Culture, expences, and produce of ten perches, 1766.

## CULTURE.

N<sup>o</sup> 4. continued. Mown for hay twice in June and September: product of the first 2 cwt. 1 qr. of the second 2 cwt. 14 lb. the first is *per* acre, 1 ton 16 cwt. the latter 1 ton 14 cwt. together, 3 tons 10 cwt.

EXPENCES.						£.	s.	d.
Twice mowing,	-	-	-	-	-	0	2	4
Making, &c.	-	-	-	-	-	0	9	3
						<hr/>		
						0	11	7
Rent, &c.	-	-	-	-	-	0	17	0
						<hr/>		
						1	8	7
						<hr/>		

## PRODUCE.

	Ton. cwt. lb.				£.	s.	d.
First cutting,	1	16	0	at 45s.	4	1	0
Second,	1	14	0	ditto	3	16	6
	<hr/>				<hr/>		
	3	10	0	-	7	17	6
					<hr/>		
					Brought		

	£.	s.	d.
Brought over,		7	17
Expences		1	8
Profit	6	8	11
Carting	0	1	8
Clear profit		1	0

## OBSERVATIONS.

This crop is better than I expected, and far more than there was any reason to expect from this soil, considering the settled opinion, that sainfoine will only thrive, where there is a rock to stop the roots from penetrating. Such general notions, unless experimentally proved, are very nearly allied to the idea, that turnips will not thrive in counties where they have never been cultivated; that clover is no good food for hogs. How long the sainfoine will last on a clayey loam, is another enquiry, which requires several years to resolve.

EXPERIMENT, N<sup>o</sup>. 6.

Culture, expences, and produce of ten perches, field L\*, 1767:

## CULTURE.

N<sup>o</sup> 5. continued. Mown twice for hay; the first produced 2½ cwt. the second 2cwt.

## EXPENCES.

	£.	s.	d.
Twice mowing,	0	2	4
Making, &c.	0	9	0
	0	11	4
Rent,	0	17	0

## PRODUCE.

	Ton.	cwt.	lb.		£.	s.	d.
First cutting,	1	16	0	at 40s.	3	12	0
Second.	1	12	0	ditto	3	2	0
					6	14	0
							Brought

						£.	s.	d.
Brought over,	-	-	-	-	-	6	14	0
Expences	-	-	-	-	-	1	8	4
Profit	-	-	-	-	-	5	5	8
Carting	-	-	-	-	-	0	1	8
Clear profit,	-	-	-	-	-	5	4	0

## OBSERVATIONS.

Sainfoine, in this trial, as well as the last appears extremely profitable; much more so, I am confident, than the application of the same land to common husbandry. As I have it not in my power to decide the duration of the crop I may just observe, that the product this year being something less than it was the last, is rather an unfavourable circumstance: this grass is generally several years before it comes to perfection, consequently the product ought this year to have exceeded the last: its falling short, looks therefore like a disagreement with the soil; but this is only conjecture: supposing the objection to have its full weight, still it is no argument against the culture on this soil, for the profit of these three years, is an object of importance, if it were certainly to last no longer; which however it would undoubtedly do.

EXPERIMENT, N<sup>o</sup> 7.

Culture, expences, and produce of half a rood, field M\*, 1765.

## CULTURE.

Yielded horse hoed turnips in 1764, ploughed in March, and twice more the beginning of April; the last threw it into five feet ridges; manured with three loads of rotten farm yard dung, turned them in by the fourth ploughing the latter end of the same month, arching up the ridges; harrowed them twice, and drilled three rows of sainfoine on each, at one foot asunder, using one peck of seed. The plants arose favourably, but the severe drought that ensued kept them very backward, the middle of June I horse hoed the rows, turning a furrow from them on each side, and throwing up a small ridge in the middle of each interval; after this the rows were well hand hoed. In July horse hoed them again, contrary to the last; in August again, and also hand hoed; cut the sainfoine the first week in September: produce of hay, 1cwt. 1qr. horse hoed after the cutting.

## EXPENCES.

## EXPENCES.

	£.	s.	d.
Four ploughings,	0	4	0
Harrowing,	0	0	3
Manuring,	0	6	6
Seed,	0	5	0
Drilling,	0	0	3½
Twice hand hoeing,	0	5	6
Four horse hoeings,	0	2	8
Cutting,	0	1	0
Making, &c.	0	2	6
<hr/>			
Rent, &c,	1	7	8½
	0	17	0
<hr/>			
	2	4	8½

## PRODUCE.

	£.	s.	d.
Half a ton of Hay,	1	7	6
<hr/>			
Expences,	2	4	8½
Produce,	1	7	6
<hr/>			
Loss,	0	17	2
<hr/>			
Ploughing,	0	9	7
Harrowing,	0	0	9
Manuring	0	7	6
Drilling,	0	0	3
Horse hoeing,	0	4	0
Carting,	0	0	10
<hr/>			
	1	2	11
<hr/>			
Total loss	2	0	1½

## OBSERVATIONS.

Sainfoine is one of those plants which come not near to perfection in the first year; I did not therefore expect this piece would be profitable; besides, the season was so remarkably dry, that all young grasses suffered extremely; a circumstance alone sufficient to render this piece unprofitable. It depends on the register of future years to decide the degree of advantage.

EXPERIMENT, N<sup>o</sup>. 8.

Culture, expences, and produce of half a rood, 1766.

## CULTURE.

This is the continuation of N<sup>o</sup>. 7. The Sainfoine appeared very early in the spring. I cut it thrice this year, June 6th, August 19th, and October 7th, horse hoeing it after each time, and twice handhoeing. The products hay, were

									Ton. cwt. qr.
The first cutting,	-	-	-	-	-	-	-	-	0 1 1
The second,	-	-	-	-	-	-	-	-	0 1 1
The third,	-	-	-	-	-	-	-	-	0 1 1
									<hr/>
									0 3 3

Which is *per* acre 1ton. 10cwt.

## EXPENCES.

									£. s. d.
Three cuttings,	-	-	-	-	-	-	-	-	0 3 0
Two hand hoeings,	-	-	-	-	-	-	-	-	0 5 6
Three horse hoeings,	-	-	-	-	-	-	-	-	0 2 0
Making, &c.	-	-	-	-	-	-	-	-	0 6 9
									<hr/>
									0 17 3
Rent,	-	-	-	-	-	-	-	-	0 17 0
									<hr/>
									1 14 3

## PRODUCE.

									£. s. d.
1ton, 10 cwt. of hay, at 45s.	-	-	-	-	-	-	-	-	3 7 6
Expences,	-	-	-	-	-	-	-	-	1 14 3
									<hr/>
Profit,	-	-	-	-	-	-	-	-	1 13 3
									<hr/>
									£. s. d.
Horse hoeing,	-	-	-	-	-	-	-	-	0 3 0
Carting,	-	-	-	-	-	-	-	-	0 2 6
									<hr/>
									0 5 6
									<hr/>
Clear Profit,	-	-	-	-	-	-	-	-	1 7 9

OBSERVATIONS.

## OBSERVATIONS.

I do not think this profit is inconsiderable, for sainfoine is not in perfection the second year; and it is only by conjecture, that I judge the horse hoeing culture to be proper for it: Mr. Tull it is true speaks largely in praise of it; but there is great reason to think him a prejudiced writer, so that too much confidence should not be placed in his opinion: it is however plain, that a cutting is gained by the effect of horse hoeing.

EXPERIMENT N<sup>o</sup> 9.

Culture, expences, and produce of half a rood, field M<sup>a</sup>, 1767.

## CULTURE.

N<sup>o</sup>. 8. continued. Cut it this year three times again: horse hoed and hand hoed after each cutting. The products of hay.

				ton.	cwt.	qr.
The first,	-	-	-	0	1	2*
Second,	-	-	-	0	1	3
Third,	-	-	-	0	1	3
				<hr/>		
				0	5	0

Which is *per* acre, 2 tons.

## EXPENCES.

				£.	s.	d.
Thrice cutting,	-	-	-	0	3	0
Making, &c.	-	-	-	0	6	6
Three horse hoeings,	-	-	-	0	2	0
Three hand hoeings,	-	-	-	0	7	6
				<hr/>		
Rent, &c.	-	-	-	0	19	0
				0	17	0
				<hr/>		
				1	16	0

## PRODUCE.

				£.	s.	d.
2 tons, at 2 <i>l.</i> 2 <i>s.</i>	-	-	-	4	4	0
Expences,	-	-	-	1	16	0
				<hr/>		
Profit,	-	-	-	2	8	0
				<hr/>		
Horse hoeing,	-	-	-	0	3	0
Carting,	-	-	-	0	2	6
				<hr/>		
				0	5	6
				<hr/>		
Clear profit.	-	-	-	2	2	6

OBSER-



## OBSERVATIONS.

I have made a much greater profit than this by lucerne. If the one plant is therefore compared with the other, sainfoine will be found much inferior; but such comparisons are not much to the purpose, unless the application of both was the same, which is not the case here. Two guineas an acre on this trial clear profit, are by no means to be slighted, and especially as the crop is evidently an improving one; for this years produce is superior to the last, which gives at least a great presumption that the next would be better than this. How well the horse hoeing culture is adapted to the plant this trial does not tell us, because *duration* is not discovered in it, and I apprehend the grand benefit of that practice for sainfoine, must be the circumstance of making the crop last longer than in the broadcast mode.

## GENERAL OBSERVATIONS.

I shall throw the particulars of these experiments into one view, that a general idea may be formed of them according to circumstances.

## EXPENCES.

	£.	s.	d.
Experiment, N <sup>o</sup> 1. broadcast, 1765,	2	3	2
N <sup>o</sup> 2, ditto, 1766,	1	8	0
N <sup>o</sup> 3, ditto, 1767,	1	9	9
	<hr/>		
Average, 1l 13s. 7d.	5	0	11

Experiment, N <sup>o</sup> 4, 1765,	2	8	7
N <sup>o</sup> 5, 1766,	1	10	3
N <sup>o</sup> 6, 1767,	1	10	0
	<hr/>		
Average, 1l. 16s. 3d.	5	8	10

N <sup>o</sup> 7, Horse hoed 1765, manured,	3	7	7½
N <sup>o</sup> 8, 1766,	1	19	9
N <sup>o</sup> 9, 1767,	2	1	6
	<hr/>		
Average, 2l. 9s. 7d.	7	8	10½

## PRODUCE.

PRODUCE.

			Ton. cwt. lb.			£. s. d.
N <sup>o</sup> 1, 1765,	-	-	1 0 0	-	-	2 15 0
N <sup>o</sup> 2, 1766,	-	-	4 5 80	-	-	9 13 4
N <sup>o</sup> 3, 1767,	-	-	4 8 0	-	-	9 4 8
			<hr/>			<hr/>
			9 13 80			21 12 11
			<hr/>			<hr/>
Average,	-	-	3 4 64	-	-	7 4 3
			<hr/>			<hr/>
N <sup>o</sup> 4, 1765,	-	-	0 12 0	-	-	1 13 0
N <sup>o</sup> 5, 1766,	-	-	3 10 0	-	-	7 17 6
N <sup>o</sup> 6, 1767,	-	-	3 8 0	-	-	6 14 0
			<hr/>			<hr/>
			7 10 0			16 4 6
			<hr/>			<hr/>
Average,	-	-	2 10 0	-	-	5 8 2
			<hr/>			<hr/>
N <sup>o</sup> 7, 1765,	-	-	0 10 0	-	-	1 7 6
N <sup>o</sup> 8, 1766,	-	-	1 10 0	-	-	3 7 6
N <sup>o</sup> 9, 1767,	-	-	2 0 0	-	-	4 4 0
			<hr/>			<hr/>
			4 0 0			8 19 0
			<hr/>			<hr/>
Average,	-	-	1 6 74	-	-	2 19 8

PROFIT and LOSS.

						£. s. d.
Experiment N <sup>o</sup> . 1, 1765, profit,	-	-	-	-	-	0 17 8
N <sup>o</sup> 2, 1766	-	-	-	-	-	8 5 3
N <sup>o</sup> 3, 1767,	-	-	-	-	-	7 14 11
						<hr/>
						16 17 10
						<hr/>
Average, 5l. 12s. 7d.						
						<hr/>
N <sup>o</sup> 5, 1766, profit,	-	-	-	-	-	6 7 3
N <sup>o</sup> 6, 1767,	-	-	-	-	-	5 4 0
						<hr/>
						11 11 3
						<hr/>
N <sup>o</sup> 4, 1765, loss,	-	-	-	-	-	0 15 7
						<hr/>
Clear profit,	-	-	-	-	-	10 15 8
						<hr/>
Average, 3l. 11s. 10d.						
						<hr/>
Vol. II.			H h			N <sup>o</sup> . 8.

			£.	s.	d.
N <sup>o</sup> 8, 1766, profit,	-	-	1	7	9
N <sup>o</sup> 9, 1767,	-	-	2	2	6
<hr/>					
N <sup>o</sup> 7, 1765, loss,	-	-	3	10	3
	-	-	2	0	1½
<hr/>					
Average, 10s.			1	10	1½
<hr/>					

The very considerable products and profit of the broadcast sainfoine are here as conspicuous as the inferiority of the horse hoed; notwithstanding the latter had advantages unenjoyed by the former; the difference is so very great, that I cannot see any great probability of the horse hoed crop overtaking the broadcast; between the first broadcast and the drilled, is a difference of more than 5 $\frac{1}{2}$ l. the first three years; the drilled must in the succeeding ones be vastly superior to balance this. In duration the latter would in all probability have the advantage; but the broadcast, at the end of these three years, tho' not so far from a decline as the other, yet has certainly many years of perfection before it can be expected to fail, if we can judge by commonly cultivated crops; and for that reason would, I believe, have the advantage on the whole; but these trials are not continued long enough to decide this matter, it remains yet doubtful.

	Ton.	cwt.	lb.	£.	s.	d.
Average, annual product of the two broad casts,	2	17	32	6	6	2
Ditto profit,	-	-	-	4	12	2

Hence we see the real importance of this culture on these soils: there is no doubt of its much exceeding the common husbandry of this neighbourhood; and I shall accordingly venture to recommend it earnestly to the attention of all good farmers, on such soils, particularly on the gravelly loams. They need not be apprehensive of their crops dying or decaying before they have been amply profitable.

## C H A P. V.

## O F B U R N E T.

A Candid person who dislikes an eternal round of opinions, without the support of facts, cannot reflect on the fate of this grass, without some disgust. The introduction of it actually raised two parties in the farming world: the professed design of one was to magnify it to the skies, and much beyond all truth; their motive originally was interest, in selling the seed at an exorbitant price. The opposite party, disgusted at this knavery, railed indiscriminately at the plant in general, and through prejudice would not allow it the merit which it undoubtedly possessed. One or two moderate men, published a few experiments on it that were sensible and spirited, but their voice was too weak to be heard, and the public continued to be deluged with volumes of reasonings and opinions about it; and to this day the matter is undecided. Some assert it to be good for nothing. Others say it is excellent. The one insist that no cattle will touch it: the other, that all cattle eat it greedily. According to one, the hay is admirable: the other are as positive that it is worthless. I let all these ideas pass me, and confine myself to experiment alone: they are matters clearly susceptible of proof, and ought therefore to be brought to the test of experiment alone.

EXPERIMENT N<sup>o</sup> 1.

Culture, expences, and produce of half a rood, field L<sup>a</sup>, 1765.

## CULTURE.

This piece yielded barley in 1764, the stubble of which was ploughed up in November. In March ploughed it twice more. The same in April, and harrowed it twice; on the last of which, sowed 2 lb. of burnet seed,

and covered it by another harrowing. The plants appeared in May and promised a regular crop, but the succeeding dry weather kept them so backward, that I did not for some time know what would be the result. A day's rain, the 14th of June, gave them fresh life, but the growth was again so damped by the severe drought that followed, that the burnet was not a crop fit to mow for hay till the latter end of August, when it was cut; and the weight of hay was 1 cwt. It sprouted again in September, but I did not feed it, as I chose to leave it a head for spring feed. The hay was well made and put in a hay house unmixed upon meadow hay, and covered with the same. In December the hay of this house came to be used for cows with calves; I remarked the effect, the burnet was carried in its turn, and eat up quite clean; I could not see that the cows preferred it, but they eat it with the same readiness as they did the other hay. At the same time I carried a bundle, and put it into the stable rack, while the horses were out; when they came home, I was in the stable; they were very hungry, and eat heartily all the common hay in the rack, but would not touch a sprig of the burnet; it was left alone in the rack for an hour, but the horses, tho' hungry, would not touch it. From these trials I concluded the hay to be proper only for cows.

EXPENCES.						£.	s.	d.
Five ploughings,	-	-	-	-	-	0	5	0
Four harrowings,	-	-	-	-	-	0	0	6
Seed, at 2s. per lb.	-	-	-	-	-	1	12	0
Sowing,	-	-	-	-	-	0	0	3
Mowing,	-	-	-	-	-	0	1	2
Making, &c.	-	-	-	-	-	0	2	0
						<hr/>		
						2	0	11
Rent, &c.	-	-	-	-	-	0	17	0
						2	17	11
PRODUCE.						£.	s.	d.
Eight cwt. hay, at 30s.	-	-	-	-	-	0	12	0
Loss,	-	-	-	-	-	2	5	11
						<hr/>		
Ploughing,	-	-	-	-	-	0	11	11½
Harrowing,	-	-	-	-	-	0	1	6
Carting,	-	-	-	-	-	0	0	10
						<hr/>		
						0	14	3¼
Total loss,	-	-	-	-	-	3	0	2¼

OBSERVA-

## OBSERVATIONS.

There are several circumstances to be remarked on this trial: the feed is the chief expence; which belongs only to the first year, that to succeeding cultivators, when the use of the plant spreads, it will doubtless become much cheaper. But the grand error of this trial was the sowing of it alone; had it been a wet season, it would have cost me the rate of twenty shillings an acre to weed it: but the drought saved me that. It should certainly have been sown like clover with spring corn; by which means the first year's expence would have been paid by that crop, and the grass have gained a year in age before its account was begun. Common hay this year yielded a much higher price than what I have charged the burnet at; but the circumstance of the horses not eating it, sunk the value greatly: for although hay that will serve cows is always valuable, yet is it a confined use; and relative to sale, any hay that an horse would not eat, would not fetch any price at all; I think therefore, I am not far from the medium in the above charge.

EXPERIMENT, N<sup>o</sup> 3.

Culture, expences, and produce, of half a rood, field L\*, 1766.

## CULTURE.

The continuation of N<sup>o</sup> 1. After the mowing in August the preceding year, the burnet arose again, so that in October and November there was an after-grass about three inches high. It was preserved; and I was much pleased to remark it during the winter, for although I could not perceive that it advanced much in growth, yet it held its verdure and diminished nothing in quantity of feed, a circumstance I never observed in any other grass. I viewed it in February, and found that it had advanced in growth. The 22d of March it was six inches high; which I thought an extraordinary vegetation. I then determined to try it with sheep, and was at the expence of herdling it off from the rest of the field for that purpose: on that day I turned in four sheep with their lambs, and it kept them just a week; this at 6*d*. a head is 16*s*. an acre. They were then taken out, but the herdles left standing: the beginning of May it was grown again enough for sheep feed: four more were put in the 8th, and it lasted them just half week, this is at the rate of 8*s*. an acre.

The first week in July, I mowed it for hay; of which the produce was 1½ cwt.

The beginning of October, cut it a second time; the produce 1 cwt. eaten by cows.

## EXPENCES.

EXPENCES.						£.	s.	d.
Twice mowing,	-	-	-	-	-	0	2	4
Making, &c.	-	-	-	-	-	0	6	6
						0	8	10
Rent, &c.	-	-	-	-	-	0	17	0
						1	5	10
PRODUCE.						£.	s.	d.
Sheep feed in the spring,	-	-	-	-	-	1	4	0
One ton of hay	-	-	-	-	-	1	5	0
						2	9	0
Expences,	-	-	-	-	-	1	5	10
Profit,	-	-	-	-	-	1	3	2
Carting,	-	-	-	-	-	0	1	8
Clear profit,	-	-	-	-	-	1	1	6

## OBSERVATIONS.

Relative to the hay, I should observe, that I tried it with all sorts of cattle; but I found that horned cattle only, would eat it freely; and even they preferred common hay to it, but this I attributed to the burnet not being made in so fine a season as the year before. All artificial grasses suffer from rain more than common grass. The fact is, that burnet hay is of an inferior nature to meadow hay, but much better than straw; horses by confinement will eat it; and horned cattle, I have found on experiment, will prefer it to the best of straw: I think it fairly worth the price I have charged; in other words, I would buy, at any time, a rick of the hay at this proportioned price.

Burnet in this trial makes no great figure: but one circumstance in the experiment is a hint how to make the most of the crop: it is evident that the grand use of it is for a spring feed for sheep. This trial yielded 24s. *per* acre so applied, which is not inconsiderable: this certainly ought to be made its principal use, for which purpose it should be left nearly a full crop in autumn, when it would preserve the herbage through winter without feeding, and so a full crop, would be ready for the sheep in spring: nor do I think it will answer well in any other application. I shall try this plan, and if it fails; I shall not think the plant worth cultivating.

EXPERIMENT N<sup>o</sup> 3.

Culture, expences, and produce of half a rood, field L<sup>m</sup>, 1767.

## CULTURE.

The continuation of N<sup>o</sup> 2. I herdled it off as before; turned seven sheep in the 26th of April, and it lasted them a week. Mowed it for hay twice afterwards; produce of the two, 2 $\frac{1}{4}$ cwt. given to the lean cattle in the farm yard.

## EXPENCES.

Two mowings,  
Making, &c.

£. s.  
0 2 4

Rent, &c.

0 9 4  
0 17 0  

---

1 6 4

## PRODUCE.

Sheep feed,  
1 ton hay,

£. s. d.  
1 8 0  
1 8 0  

---

2 16 0

Expences, - - - - -

1 6 4  

---

1 9 8

Profit, - - - - -

1 9 8

Carting, - - - - -

0 1 8  

---

1 8 0

Clear profit, - - - - -

## OBSERVATIONS.

Mowing the burnet too late in Autumn 1766, I had it not in my power to try the sheep feeding a full crop; but still I must conclude, from this trial as well as the last, that such a practice would be the most profitable.

GENERAL OBSERVATIONS ON N<sup>o</sup> 1, 2, and 3.

I shall throw these experiments into one view, for the sake of clearly understanding the result.

## EXPENCES.

Experiment N<sup>o</sup> 1, 1765,  
2, 1766,  
3, 1767,

£. s. d.  
3 12 2 $\frac{1}{2}$   
1 7 6  
1 8 0  

---

6 7 8 $\frac{1}{2}$

Average, 2*l.* 2*s.* 7*d.*

## PRODUCE.



## PRODUCE.

		£.	s.	d.
Experiment N <sup>o</sup> 1, 1765,	- - - - -	0	12	0
2, 1766,	- - - - -	2	9	0
3, 1767,	- - - - -	2	16	0
Average, 1l. 19s.		5	17	0

## PROFIT and LOSS.

		£.	s.	d.
Experiment N <sup>o</sup> 1, los,	- - - - -	3	0	2½
N <sup>o</sup> 2, profit,	- - - - -	1	2	6
3, ditto,	- - - - -	1	8	0
		2	10	6
Los,	- - - - -	0	9	8½
Average, 3s. 2¼d.				

Burnet, in these tables, does not appear to advantage, and yet they do not absolutely condemn it. To sustain a loss upon a crop for three years is a discouraging circumstance; but there are several points to be considered before we dwell on that alone. The seed cost 2s. *per* lb. which is eight times as much as it is to be had for at present, and it will probably sink lower: this makes a difference of 1l. 8s. in the account, so much reducing the expence of 3l. 0s. 2¼d. Another circumstance which would totally reduce it is the sowing with corn; for want of knowing better, I sowed the burnet alone, consequently a year's expences laid on that year's crop though good for nothing: whereas I, at present well know that is much more advisable to sow with corn. This state of the case therefore strikes the first year out of the table, and leaves the two succeeding ones only to be considered. Their profits are 1l. 2s. 6d. and 1l. 8s. upon which I should remark, that a different conduct in keeping a larger growth for sheep feed, would probably have been more advantageous; but supposing otherwise, I do not think a clear profit of 1l. 8s. *per* acre (and there is some reason from the increase from 1l. 2s. 6d. to that sum, to suppose it would yet further increase) is, on these soils, small enough to allow a condemnation of the plant. Considering the lowness of the expences, and the little hazard attending the culture, it is certainly much more beneficial than our common husbandry: it is above a rent and half clear profit; and I will venture to declare that I had rather have a field under such a crop as burnet, than under the common husbandry of this neighbourhood, upon an average of the farmers, good and bad.

EXPERIMENT, N<sup>o</sup> 4.

Culture, expences and produce of one acre, field P, 1767.

## CULTURE.

Sown with summer fallow barley in 1766, 20lb. of feed ; it came up very favourably ; it was preserved from cattle after the barley was cut, being left a fine herbage for spring feed. April 27th, I turned in twenty sheep with their lambs, and it kept them a fortnight. After which it was pastured with horses, cows and sheep, maintaining at different times, twenty sheep a week, two horses a week, one cow and three had of young cattle a week. They all, except the sheep, were backward in beginning the burnet ; they eat down a ~~small~~ <sup>small</sup> border quite bare, before they touched it, but afterwards they fell to with a good appetite, and did not refrain any more.

EXPENCES.							£.	s.	d.
20lb. feed,	-	-	-	-	-	-	0	5	0
Sowing,	-	-	-	-	-	-	0	0	3
							0	5	3
Rent, &c.	-	-	-	-	-	-	0	17	0
							1	2	3
PRODUCE.							£.	s.	d.
Keeping 20 sheep a fortnight, at 6d.	-	-	-	-	-	-	1	0	0
Ditto a week, at 3d.	-	-	-	-	-	-	0	5	0
Two horses a week,	-	-	-	-	-	-	0	3	0
One cow ditto,	-	-	-	-	-	-	0	1	6
Three young cattle 3 weeks,	-	-	-	-	-	-	0	9	0
							1	18	6
Expences,	-	-	-	-	-	-	1	2	3
Profit,	-	-	-	-	-	-	0	16	

## OBSERVATIONS.

This experiment is in favour of burnet : to have 20s. worth *per* acre of sheep feed the first fortnight in May, and certainly before the plant is come to perfection, is a considerable acquisition ; and the general product of near 40s.

an acre, yielding (seed deducted) 16*s.* 3*d.* an acre clear profit, is altogether a beneficial crop for the first year, and gives me hope that this grass may turn out advantageous. I had another piece of burnet for two of these three years, which equalled these, but through accidents, no minutes were taken of the cattle it kept.

END of the FIFTH BOOK.

EXPERIMENTAL  
AGRICULTURE.

BOOK VI.  
OF MADDER.



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B O O K VI.  
OF M A D D E R.

**T**HE culture of this plant is no where common husbandry in Suffolk : it was a general report of great profit to be made by it that first induced me to think of it. The Society's premiums had made it common conversation. I was so little acquainted with it before, that the following trials must, without further introduction, speak for themselves.

EXPERIMENT N<sup>o</sup> 1.

Cultivation, expences, and produce of an acre, Field L\*, planted 1765.

The description Mr. Millar gives of the proper soil for this plant, made me chuse this field for my first experiment, as I thought it nearer the exact one than any other I had. In 1764 it was cropped with barley ; the middle of November I ploughed in the stubble, but could not stir it again till the 25th of March, when I gave it another clean ploughing, deeper than common. The 27th and 28th, I ploughed it with two ploughs, following each other in the same furrow, the first with two horses, and the last with four stout ones.

Foreseeing that I had no plough which would bear such strong work as cutting deep into earth which had never been stirred before, I made a new one on the occasion, very stout, pitched deep, and ironed in a very strong manner. I found it difficult to get any great depth even with this plough and four horses, so to make it enter as deep as possible, I ordered a labourer to lay himself along on the beam, quite to the head, and by this means following the other plough, I gained a depth of fourteen inches.

I had

I had the plants (above 20,000) from the Rev. Mr. Peele of Tilney in Norfolk; but not receiving them, through accident, at the time I expected, I procured thirty two men and boys to plant, that I might be within the time required by the Society.

The land was ploughed into beds eight feet broad, and as the Society's distance is two feet from row to row, and one foot from plant to plant in the rows, there were of course five rows on a bed. Before I suffered any one to go on the ground, I strained lines along a whole bed, and then sent in the boys to drop the plants by the lines; the men followed with dibbles and planted them. As fast as they finished a line, myself and a gardener instantly removed it to the next bed, so that by the time they had finished one bed another was ready lined for them: by regularly following this method, and not suffering any one to move but when called on, I got the whole twenty thousand plants set by five o'clock in the evening, notwithstanding a very heavy shower of rain which came unluckily in the time. On such, or other occasions, these few hints may be of use when great expedition is necessary. The beginning of April a labourer walked along the rows to see if the plants were all properly in the ground, and to close the earth on such as had been negligently planted: this he performed in two days. April 16th, I ordered a mixture of lime, sand and ashes, of each twelve bushels to be sown along the rows of plants. This I did to correct the sourness of the soil newly turned up; and I believe it answered, in that respect, as well as preventing the surface caking in the rows.

May 29th, I would have stirred the earth between the rows with my single cultivator, made on the plan of M. de Chateaufieux, but the rains which fell soon after the planting, and the succeeding hot weather, baked the surface so that it broke in large pieces, I was therefore obliged to hand hoe it, which destroyed the few weeds that had got up, and loosened the surface a little.

June 5th, I gave it a second hand hoeing, for notwithstanding the extreme hardness of the surface, yet those savage invaders the weeds sprung up with great rapidity, and this time the men could only cut them off even with the ground. The continued dry weather was of great prejudice to the plants, most of them looked but indifferently as to colour, and many others died or but just appeared above the ground. This weather lasted till the 14th, when it pleased God to send a most refreshing rain of above twelve hours, which although it did not penetrate to the roots of every thing (for it came very gently) yet enabled me to enter with my cultivator the next day.

June 15th, I directed it to be guided up and down between every row, and saw it performed; the ground broke pretty well, and the instrument penetrating about four or five inches deep and stirring the earth near a foot wide loosened the surface very tolerably, but as many clods remained and were turned on to the plants, I caused a labourer to walk along the rows with a hoe.

hoe, to pluck up the few remaining weeds, free the plants, and loosen the earth between them; and a clodding beadle, to break the large clods in pieces; so that behind him the ground had a neat appearance enough. At this time some of the plants were just coming out of the ground, and the highest did not exceed seven inches.

From this time to the 13th of August was a continued drought, very prejudicial to the madder, especially as the earth was not in fine tilth: however on July 9th it was again horse hoed, and directly hand hoed. This last operation was again performed between the 7th and 17th of August, that the weeds which continually sprouted might be effectually destroyed. I then measured the plants; the highest were rather better than a foot long; the middling ones seven inches, and the lowest two or three inches. The 14th of August, I found the earth so loose and moist with the rains that fell then, that I had it hoed again twice in a place; and the rain falling again the 18th, 19th, and 20th of September, I repeated that double operation.

The beginning of November, I observed the hauln of many of the plants was nearly withered; and as most of the writers who treat of madder direct the earth of the alleys should be spread over the plants for the winter, I resolved to pursue that plan as nearly as the distances of my rows would allow me: but as doing this with a spade would be a most tedious and expensive work, I ordered a common plough to go a bout between the rows, throwing up a slight sharp ridge over each row of madder, nearly covering the hauln over the whole acre; and that the ground might lay dry during the winter I cut a water furrow at the bottom of it and opened the mouths of all the furrows [the reader should remember the rows were struck on arched steatches] into it, by which means no water could remain any where. In this manner I left it for the first winter.

1766.

In the spring, 1766, the first care after the land was perfectly dry, was to harrow down the little ridges and throw the surface as flat as the arched shape of the beds would admit. This operation was performed the 23d of March; by the 21st of April the young shoots were two inches high on many of the plants; so that the rows were distinctly seen. I split off 20,000 plants for a fresh acre.

Between the 6th and 12th of May, I ordered it to be hand hoed; the weeds made but little appearance, but I thought the stirring the earth necessary between the plants, which was effectually performed, and the few weeds cut up. The wetness of the summer made the madder grow very vigorously, and among it many weeds. In June I set a labourer to hoe it again, but the trailing branches on the ground were so weak and brittle that he could not effect the work without doing great damage to the crop, by breaking the branches. This is a most unfortunate circumstance attending madder. Au-

gust



gust 26th, many of the weeds had got to such a head, that I determined to mow the whole, to prevent their dropping their seeds, and to enable me to hoe or plough between the rows, to leave it in good order in ridges for the winter, which was accordingly done.

1767.

In April I harrowed down the ridges that were thrown over the rows the Autumn before ; but as I conceived that the roots, if they arrived at any size must have shot much into the intervals, I apprehended that horse hoeing this last year would cut the roots too much, I determined only to hand hoe it, which was accordingly done, for the first time, in May. I attended particularly to this hoeing, because the shoots being young gave an opportunity to clean it effectually, which was accordingly done ; and I found the good effects of it, in the crop continuing very clean : however, it was hand hoed twice more, which kept it, upon the whole, in good order. Dug up the crop in April 1768, and dried it for some time in the sun, and threshing it found, upon examination, that it required being yet drier. It was then dried in a malt kiln, and being sifted through very fine wire sieves, was separated into the roots and siftings, and being weighed very carefully and quite dry, was found to amount to 168 lb. It was directly sent up to Mr. George Rutt of London, who wrote for answer, that it was not marketably dry ; after which he dried it again, and advised me that the weight neat was 3 qrs. 25 lb. at 5*l*. came to 4*l*. 17*s*. 6*d*. which was sent accordingly (with 5*l*. premium from the Society) the whole amount of the product of this acre, that had been carried through three years continued culture. Before I offer any observation, I shall state the account.

#### EXPENCES.

	1765.	£.	s.	d.
Trench ploughing,	- - - - -	0	3	0
Three common ditto,	- - - - -	0	3	0
The plants,	- - - - -	10	10	0
Expences bringing them from Norfolk,	- - - - -	0	13	0
Planting,	- - - - -	2	1	10
Packthread to mark the rows to plant by,	- - - - -	0	2	6
Filling vacancies,	- - - - -	0	2	6
Lime, sand, coal ashes and labour,	- - - - -	0	10	6
First hand hoeing,	- - - - -	0	7	6
Second ditto,	- - - - -	0	6	9
Horse hoeing six times,	- - - - -	0	9	0
Third hand hoeing,	- - - - -	0	6	8
Carried over,	- - - - -	15	16	3

	£.	s.	d.
Brought over,	15	16	3
Breaking the clods,	0	7	0
Fourth hand hoeing,	0	5	0
Fifth ditto, and weeding,	0	9	0
Covering the haulm,	0	1	6
Water furrowing,	0	2	0
<hr/>			
Rent, &c.	17	0	9
	0	17	0
<hr/>			
	17	17	9
<hr/>			

1766.

	£.	s.	d.
Harrowing,	0	0	11½
First hand hoeing,	0	4	6
Second ditto,	0	10	0
Mowing, &c.	0	2	3
Third ditto,	0	5	6
Water-furrowing,	0	1	0
Ridging up,	0	1	6
<hr/>			
	1	4	10½
Rent,	0	17	0
<hr/>			
	2	1	10½
<hr/>			

1767.

	£.	s.	d.
Harrowing,	0	0	0
First hand hoeing,	0	0	0
Second and third ditto,	0	0	0
Digging up,	0	0	0
Water furrowing,	0	0	0
Drying, cleaning, threshing and sifting,	0	0	0
Carriage,	0	0	0
<hr/>			
Rent, &c.	0	0	0
<hr/>			

						£.	s.	d.
First year,	-	-	-	-	-	17	17	9
Second ditto,	-	-	-	-	-	2	1	10½
Third ditto,	-	-	-	-	-	4	12	2½
Total expence,	-	-	-	-	-	24	11	10

## PRODUCE.

						£.	s.	d.
By sale of the madder, 168 lb. at Bradfield, 109 lb. at London, at 5 <sup>l</sup> .						4	17	6
Society's premium,	-	-	-	-	-	5	0	0
						9	17	6
Expences,	-	-	-	-	-	24	11	10
Produce,	-	-	-	-	-	9	17	6
Loss,	-	-	-	-	-	14	14	4

						£.	s.	d.
Ploughing,	-	-	-			0	11	11½
Manuring,	-	-	-			0	0	2½
Horse hoeing,	-	-	-			0	19	2½
						1	11	4½
Total loss,	-	-	-	-	-	16	5	8½

## OBSERVATIONS.

It is difficult to know in what light this experiment should be considered; for, at the same time, that this trial turns out so extremely bad! yet it is as certain, that madder is in some places a *very* profitable culture. This vast difference is surprizing, when it is considered that the greatest part of the above product is the Society's premium, and that without it, the loss would have been above twenty guineas. Such a difference can be owing to nothing but variation of soil, or excessive manuring. It is true, the plants are particularly expensive for the first crop; but still the difference made by that circumstance is of no great account. I remarked the progress of the experiment very attentively; and apprehend the following were the causes of my ill success.

The soil certainly is not the proper sort; it is neither loose enough, nor rich enough. The tender roots, being by no means so strong as those of carrots, require, I should think, a yet looser soil to spread in; and at the same time that this looseness is absolutely requisite, it seems to require a much more fertile one than mine; for the roots where they did penetrate, were of a paltry size, shewing no luxuriance  
of

of growth. But as I had not a choice of a loose sandy loam; it was a great error not to manure the piece very amply. Mr. Miliar says, dung is pernicious; such a fact surpasses my comprehension: but there are other manures besides dung: a very thick covering of coal ashes, mortar-rubbish, foot, malt dust, lime, sand, &c. &c. would tend very powerfully to change the nature of this clayey loam, and convert it into a soil more like the sandy loam. Another great error was in the tillage I gave; the trench ploughing should have been in October, for the frosts to have broken and sweetened the land: whereas in my spring one, no such effect could take place. The time fixed on by the Society was also very erroneous; it forced me to go on to my land while it was wet, which is a very pernicious practice; much later in the season I could have chosen a time which would have given me a much better chance for a crop. The specification of the distance of the rows was also another great blunder: horse hoeing, I apprehend is of service to the madder (but it is a point I am by no means clear in) now in two feet among trailing plants, that fall to the ground at six or eight inches in length, and withal the most brittle plant, I know, how is it possible to horse hoe to any effect, and without doing great mischief to the plants?

Upon the whole, this trial, for the preceding reasons, does not prove any thing against madder in general; as a wrong soil, and errors in the culture, rendered it unprofitable: but I am very clear from the result, that no conduct would render it beneficial on my land: the products may be advanced, but never to equal the expences.

Another point, relative to the crop in general, is of great importance; it is the way in which the grower disposes of it. Supposing the farmer when he raises a crop of wheat, had no market in the country for it, but was forced to send it to London, and to people who reserved a power to charge their own price for it; to complain of the dressing and cleaning; to say, that it was not clean enough from soil; to clean it further themselves; then to new measure the quantity; and to write to the farmer, that the wheat instead of coming to 20*l.* is worth only 14*l.* Suppose I say, that wheat or any other crop under heaven, was in such a predicament; I will venture to assert, that not an acre would ever be cultivated, except by those whose situation made them purchasers or consumers, as well as growers. This is precisely the case with madder: and with the material addition of a greater difficulty in cleaning and drying, to render it what *the purchasers are pleased to call marketable*, than even in growing it. It loses in drying; and yet your crop shall waste? and not be accepted as *marketable*. And who is to be your judge? Who is to decide between the cultivator and the buyer? Why, the buyer himself. A special train of business this! What but infatuation or folly can induce any one to culti-

vate madder in such circumstances. I am clear, that my soil will not do for it; I shall therefore extend my plantations no farther than the mere scale of experiment; but were I to find the best soil in Europe for it, I would never be such an idiot to cultivate it for profit, unless I did it on a scale large enough to have all the buildings and the apparatus necessary for manufacturing it; that it might have the same chance for a market that all other crops have. Without possessing this advantage, I hold all others as worthless.

### EXPERIMENT, N<sup>o</sup> 2.

In March 1765, receiving more plants than were necessary to plant the acre of the preceding experiment, I thought it might be of some use to try them in the same field as that acre, but under a much more perfect culture, that the effects might be seen of both: With this view, in April I dug two square perches of land three feet deep; turning in at the same time ten bushels of coal ashes, mixed well with the soil: also fifteen bushels of rotten hog and horse dung; all bought at Bury: the first is the proportion of ten waggon loads *per* acre; the second, fifteen. Planted the madder in rows two feet distant, and one foot in the rows. It flourished very well throughout the season; though not so luxuriant as it would have been in a wetter year. It was hand hoed four times.

In 1766, it was a very fine growth, the whole ground quite covered with the stalks: hand hoed it thrice; and hand weeded it once. In 1767, hand hoed it twice, and gave it one weeding.

Dug it up in October, turning over the whole body of earth as deep as it was dug before, and picking out the roots quite clean: weighed them directly; they amounted to 84 lb. dried as much as possible, until it appeared as dry as dust; it weighed 10 lb. this is 800 lb. on an acre, which at 3*l.* a cwt. is 21*l.* 7*s.* 6*d.* At 3*l.* 10*s.* *per* cwt. it is 24*l.* 18*s.* 9*d.* At 4*l.* *per* cwt. it is 28*l.* 10*s.* at 5*l.* *per* cwt. it is 35*l.* 12*s.* 6*d.* The expence of cultivating an acre in the same manner would be 50*l.* 15*s.* 8*d.*

### OBSERVATIONS.

From the best accounts we have of the product of good crops of madder, this is but an indifferent one; and is very far from answering the expence. From hence I cannot but conclude that it would be a vast work to render this soil proper for madder. Mr. Millar has one assertion among others very unfavourable to it: that you must vary the madder grounds, and not plant two or three crops running on the same soil. Now if madder might be planted again on the old land, it would in this cul-  
ture,

ture, make a great difference in the expence; because the same digging that took up the crop, would prepare the land for the new one; and I cannot but think that this method would answer better than changing the ground, not only in the expence, but also in the old land being in better order than any new can be made.

EXPERIMENT, N<sup>o</sup> 3.

Culture, expences, and produce of an acre, field T. 1766.

## CULTURE.

In October 1765, I trench ploughed this acre, gaining a depth of twelve inches; and cut deep water furrows through it. The first week in March took advantage of the very fine weather to plough it in the common manner; throwing it on to four feet ridges. The middle of the same Month reversed them. The first week in April was too wet to go on to the land; but in the following, arched up the ridges and harrowed them; planted a double row at one foot distance on each ridge, the plants one foot asunder. This form is the same as equally distant at two feet, in respect of a number of plants; but having found the difficulty of horse hoeing such, I varied it the better to admit the plough.

The latter end of May, hand hoed the ridges, and after it, horse hoed them, turning a furrow from the plants, and throwing up a small ridge in the middle of each interval. In July gave a second hand hoeing, and succeeded it by another horse hoeing. In September, weeded the rows. The latter end of October, the haulm of the plants was turned on to the crowns of the ridges, and then I sent in Men with shovels; to cover it with the loose moulds that were left in the intervals which was accordingly done, and the whole acre left in a most neat and husband-like manner.

1767.

The land was left without performing any operation till the young shoots appeared through the earth, laid on the beds the autumn before: this acre and that planted in 1765, then afforded plants for a third; but chiefly the latter. The first week in June, horse and hand hoed it. Repeated both operations in July, and also in August. In September, horse hoed for the fourth time; and in October covered the haulm as last year.

1768.

I was not on the spot to attend the culture this year, but my orders were very exactly executed by my bailiff, who had seen much of my cultivation of madder

madder before. It was horse hoed twice, and hand hoed twice; dug up in April, 1769, dried quite in the sun; cleaned, threshed and sifted; weight 92 lb. which was sold for 3*l*. 15*s*.

## EXPENCES.

1766.				£.	s.	d.
Trench ploughing,	-	-	-	0	2	0
Three common ditto,	-	-	-	0	3	0
Harrowing,	-	-	-	0	0	3
Water furrowing,	-	-	-	0	1	6
Slipping off the fetts,	-	-	-	0	7	6
Planting,	-	-	-	1	2	0
Filling vacancies,	-	-	-	0	2	0
Two hand hoeings,	-	-	-	0	12	0
One weeding,	-	-	-	0	4	0
Two horse hoeings,	-	-	-	0	1	6
Covering the haulm,	-	-	-	0	12	0
				<hr/>		
Rent,	-	-	-	3	7	9
				0	17	0
				<hr/>		
				4	4	9
				<hr/>		
1767.				£.	s.	d.
Four horse hoeings,	-	-	-	0	3	0
Three hand hoeings,	-	-	-	0	14	6
Water furrowing,	-	-	-	0	0	8
Covering the haulm,	-	-	-	0	10	2
				<hr/>		
				1	8	2
Rent,	-	-	-	0	17	0
				<hr/>		
				2	5	2
				<hr/>		
1768.				£.	s.	d.
Two horse hoeings,	-	-	-	0	1	6
Two hand hoeings,	-	-	-	0	10	0
Digging up,	-	-	-	1	0	0
Drying, cleaning, threshing and sifting,	-	-	-	0	18	9
				<hr/>		
				2	10	3
				Brought		

								£.	s.	d.
Brought over,	-	-	-	-	-	-	-	2	10	3
Rent, &c.	-	-	-	-	-	-	-	0	17	0
								3	7	3
First year,	-	-	-	-	-	-	-	4	4	9
Second,	-	-	-	-	-	-	-	2	5	2
Third,	-	-	-	-	-	-	-	3	7	3
Total expence.	-	-	-	-	-	-	-	9	17	2

## PRODUCE.

								£.	s.	d.
Society's premium,	-	-	-	-	-	-	-	5	0	0
Produce,	-	-	-	-	-	-	-	3	15	0
								8	15	0
Expences,	-	-	-	-	-	-	-	9	17	0½
Produce,	-	-	-	-	-	-	-	8	15	0
Loss,	-	-	-	-	-	-	-	1	2	2

£. s. d.

Ploughing,	-	-	-	-	0	11	11½
Harrowing,	-	-	-	-	0	0	9
Horfe hoeing,	-	-	-	-	0	9	8

								1	2	4½
Total loss,	-	-	-	-	-	-	-	2	4	6½

## OBSERVATIONS.

The expences being much reduced in this trial from what they were in experiment N<sup>o</sup> 1. the account is not so unfavourable; but if we reckon the profit that ought to have been made by the land in three years, we shall have very little reason to recommend this branch of husbandry to any persons on such a soil. It is evident, that madder requires very different land; either naturally or artificially fertile, and that to an high degree. From the observations I have made on it, I do not conceive that any soil in the world can be too rich for it: and if such vast profit was ever made on it, as we read in some books, it must certainly have been on a soil very deep, and amazingly fertile: though I have no conception of any acre ever producing 2 or 300%. as is asserted by more writers than one.

GENERAL



## GENERAL OBSERVATIONS.

Those who have cultivated madder with the success boasted by the writers of husbandry, should not hold these trials in contempt: there appears to me almost as much use in registering trials that are very unsuccessful as in those that are ever so profitable: for it is certainly of as much consequence to tell one man that his soil *will not do* for madder, as to assure another, that his *will do*. Instead of an acre or two, I might possibly have launched (like many others) into five, ten, or fifteen, in which the loss would have been no trifle. And it surely is highly incumbent on every one to make known to the world such of his experience as will probably be of any use to it. Several persons being unsuccessful in a culture, is too apt to prejudice others *in general* against it: however irrational, still it is so; and it ought *to be a* caution, not to recommend any thing in general, under the extravagant notion, that because an article of culture is very profitable on one soil, that it must be the same on very different ones.

But what I hinted in the trial of 1765, will remain the grand obstacle to the culture of madder: this is the difficulty of sale: for while a man has not a fair market for his unmanufactured madder, none can with any prudence engage in it unless on so large scale as to admit the whole apparatus of reducing it to such a state as to be absolutely a marketable commodity. In answer to this, it may be said, madder really dry is a *marketable commodity*; but this matters not a groat, if the purchaser has it in his power to be a knave: he has a pretence, a screen always at hand that will cloak the greatest knavery; and to a degree known in no other branch of agriculture. Among the gentlemen of trade, who have a mutual understanding, and confidence, such objections appear trivial, but to the cultivator, at a distance from the market, it is a very different affair. He writes to a madder merchant to know the price: the answer is, *four pounds an cwt.* Up he sends his madder, and instead of 4*l.* receives but 3*l.*—Not from a variation in *price*, but in *weight*. It may be said, that the correspondent at London, may be in the right. Very true; but will the countryman believe it? He thinks himself so——and has no other proof but the interested assertion of the man who buys it. Is it not extremely evident, that in such a case, the cultivator will be disgusted; and throw aside a business in which he knows, neither the market weight, nor the market price. As to myself, I doubt not the profit of madder on proper soils, but whatever land I may hereafter possess, never shall I dream of cultivating, at a vast expence, a plant, in the sale of which, I am for weight and price, *absolutely* to depend on the honesty of the purchaser. If encouragement is designed to this

this culture from any quarter ; it should not be exclusive of this circumstance : manufactories should be erected and established, in which the madder is prepared for any one at so much an cwt. and not by any persons the least concerned in purchasing ; then the cultivator would have a commodity in his hands which he could sell in as simple and fair a way as any other. If nothing of this sort can be effected, all encouragements should be for such a number of acres, (and no less) as will answer the expence of a private manufacture, which would prevent persons being unguardedly drawn in, by premiums apparently considerable, to cultivate a root which when raised, is in its sale, absolutely at the mercy of the purchaser. \*

\* An acre not here registered was also planted in the year 1767, and conducted through that year ; but leaving the farm the new tenant ploughed it up.

## END OF THE SIXTH BOOK.



EXPERIMENTAL  
AGRICULTURE.

BOOK VII.

COMPARISON BETWEEN THE  
DRILL AND BROADCAST  
HUSBANDRY.



## B O O K VII.

## COMPARISON between the DRILL and BROADCAST HUSBANDRY.

**T**HE comparison of the old and new husbandry in the separate culture of various plants, by no means decides the general merit of either. It was necessary, in order to gain this important knowledge, to compare two or three pieces of land, the one continued for several years under the old method, the other for several under the new; by which would be discovered the most beneficial. Upon my first meditating trials in the new culture, the necessity of this sort of comparison struck me, as by much the most important.

In most of the books of husbandry that treat of this comparison, parallels are drawn that might as well be the works of mere imagination: two or three drilled crops are taken, and the profit of them supposed to continue for many years; and in others, drilled and broadcast crops are compared that were not executed with a view to the comparison; growing perhaps in different fields, and the operations on each performed at different times. It is clear to me that such comparisons are of no utility.

EXPERIMENT N<sup>o</sup> 1.

\* Culture, expences, and produce of three roods, field M\*, 1764, &c.

## CULTURE.

I chose three pieces of land of no larger size for this comparison on many accounts, which I have more than once explained, that the experiment might be totally under command, and no inequalities arise from not being able to act perfectly similar to three divisions. I could have taken three acres for it with as much ease as three roods, but the authority of the trial

trial would not have been equal: three acres to each division would have pleased many, but then the authority would have been absolutely destroyed.

The soil of these roods is perfectly the same, a good gravelly loam found enough for turnips, and at the same time strong and rich enough for wheat. The preceding culture had also been exactly the same; yielding barley in 1763, the stubble of which was ploughed up in November.

One of these roods I dedicated to the culture of wheat alone in the horse hoeing husbandry, on the principle of Mr. Tull; this rood I shall call N<sup>o</sup> 1. Another I apply to the horse hoeing culture, but the crops varied; this is N<sup>o</sup> 2. The Third is to be cropped in the common Suffolk method broadcast, N<sup>o</sup> 3.

My plan was to manure N<sup>o</sup> 2 and 3 equally, but not N<sup>o</sup> 1. in compliance with Mr. Tull also, though much against my own idea. I asked a friend's opinion on this point: and he was clearly in favour of manuring it like the rest, least a false idea in Mr. Tull, should bring me into an unfair treatment of the mode.

Before I insert the register, I should observe here, (instead of numerous repetitions which I have struck out) that the treatment of the roods, was as similar as the case would allow; N<sup>o</sup> 1. being very different, could not be guided by either of the others, but the manure is precisely equal to all. N<sup>o</sup> 2, and 3, began each with turnips, for which crop every operation was performed at the same hour; but different crops following, the same rule could not afterwards be preserved. The general plan of doing equal justice to all according to their respective natures, was minutely executed, which I was enabled without difficulty to do from the smallness of the pieces.

#### Account of N<sup>o</sup> 1.

1764.

Ploughed up the barley stubble in November, 1763. In March, 1764, gave it the first spring earth; ploughed it once more in April, and harrowed it thrice, this left it fine, and many weeds sprouting, they were turned down by the fourth earth, the first week in June; stirred it again in July; in August threw it into five feet ridges by the sixth earth; the first week in September manured them with five loads of rotten farm yard dung; turned it in by arching up the ridges, and harrowing once; drilled three rows of wheat at a foot asunder on each, leaving the intervals consequently three feet wide; the quantity of seed a peck and a half.

1765.

The rows carried a very beautiful appearance through the spring; the first horse hoeing was given the 28th of March, turning a furrow from the  
rows,





1766.

The last week in August, the stubble of the preceding crop was chopt, raked into heaps, and carted away, and the ridges directly reversed. The 23d of September arched them up by a second ploughing, harrowed twice and drilled each as before, with three rows of wheat, using a peck and half of seed. The land in very favourable order from rain the 18th, &c. I took advantage of a remarkable fine season, the beginning of March, to give the first horse and hand hoeings. The 25th of April horse hoed it again. May 17th, hand hoed the rows again. The 28th, gave the third horse hoeing. June 18th, hand hoed it again, and weeded the rows very carefully. Such multitudes of showers had fallen, that the weeds arose so fast, that it was a matter of the greatest difficulty to keep them under; the 21st, horse hoed it for the last time; after this I found it necessary to give one more weeding. Reaped the 26th of August; produce, three bushels and one peck.

## EXPENCES.

	£.	s.	d.
Cutting and carting the stubble,	0	1	3
Two ploughings,	0	0	6
Harrowing,	0	0	0½
Drilling,	0	0	0½
Seed,	0	1	11½
Four horsehoeing,	0	0	8
Three hand hoeings,	0	3	4
One weeding,	0	1	0
Reaping,	0	1	0
Harvesting,	0	0	9
Threshing,	0	1	3
	<hr/>		
	0	11	10
Rent, &c.	0	4	3
	<hr/>		
	0	16	1
	<hr/>		

## PRODUCE.

	£.	s.	d.
Three bushels one peck, at 48s.	0	19	6
Expences,	0	16	1
	<hr/>		
Profit,	0	3	5

Ploughing,

						£.	s.	d.
Brought over,	-	-	-	-	-	0	3	5
						£.	s.	d.
Ploughing,	-	-	-	-	-	0	1	2½
Harrowing,	-	-	-	-	-	0	0	2½
Drilling,	-	-	-	-	-	0	0	0½
Horse hoeing,	-	-	-	-	-	0	1	0
Carting,	-	-	-	-	-	0	0	1½
							2	6½
Clear profit, 3s. 5d. per acre,	-	-	-	-	-	0	0	10½

1767.

The first week in September, cut and carried the stubble as before, and reversed the ridges; the 15th, arched them up, harrowed and drilled them with treble rows as last year, using a peck and half of seed. April 11th, hand hoed the rows; the 27th, horse hoed for the first time. May 16th, hand hoed the second time. June the 5th, the second horse hoeing; the weeds came up as fast this year as last, but I kept the corn quite clear of them. June 19th, hand hoed and weeded the rows; the 26th, horse hoed again, and the first week in July, the fourth and last; the 8th of the same month, another hand hoeing. Reaped the 22d of August; produce, two bushels, one peck.

						£.	s.	d.
EXPENCES.								
Cutting and carting the stubble,	-	-	-	-	-	0	1	3
Two ploughings,	-	-	-	-	-	0	0	6
Harrowing,	-	-	-	-	-	0	0	0½
Drilling,	-	-	-	-	-	0	0	0½
Seed,	-	-	-	-	-	0	2	3
Four hoeings,	-	-	-	-	-	0	0	8
Three hand ditto,	-	-	-	-	-	0	3	6
Two weedings,	-	-	-	-	-	0	1	9
Reaping,	-	-	-	-	-	0	1	0
Harvesting,	-	-	-	-	-	0	0	9
Threshing,	-	-	-	-	-	0	0	10
							12	7½
Rent,	-	-	-	-	-	0	4	3
							16	10½
					Carried over,	0	16	10½
					Brought			

	£.	s.	d.
Brought over, - - - - -	0	16	10½
PRODUCE.			
Two bushels, one peck, at 48s. - - - - -	0	13	6
Less, - - - - -	0	3	4½
	£.	s.	d.
Ploughing, - - - - -	0	1	2½
Harrowing, - - - - -	0	0	2½
Drilling, - - - - -	0	0	0¼
Horse hoeing - - - - -	0	1	0
Carting, - - - - -	0	0	1½
	0	2	7
Total loss, 1l. 3s. 10d. per acre, - - - - -	0	5	11½

## RECAPITULATION.

	£.	s.	d.
1764 and 1765, profit per acre, - - - - -	1	3	4
1766, ditto, - - - - -	0	3	5
	1	6	9
1767, loss, - - - - -	1	3	10
Profit on four years, - - - - -	0	2	11

ACCOUNT of N<sup>o</sup> II.

1764.

In November ploughed up the barley stubble; sowed it again in March following. Gave another ploughing in April, and three harrowings; leaving it in this manner till the last week in May; many weeds came up, which were buried by the fourth earth. June 9th, threw it on to five feet ridges, and manured it with five loads of rotten farm yard dung; the 13th, turned it in by arching up the ridges. The 16th, harrowed them and drilled a double row on each ridge, sixteen inches asunder, with turnip seed. The plants came up very favourably; were strong enough to stand the hoe, July the 9th, when that operation was performed; setting them out to the distance of one foot from plant to plant; the 23d, gave the first horse hoeing. August the 3d, hand hoed them again, cutting up all weeds, loosening the ground, and leaving the plants single that accident had left double

double before: the 9th, horse hoed them the second time: the 30th, for the third time; each, the reverse of the former. September the 8th, the fourth and last horse hoeing was given. At this time the turnips were advanced to a very large growth, to their full growth in the opinion of several who viewed them; but in this I differed from them, having seen broadcast crops with many larger roots. However as I determined to drill the land with wheat, I offered them to sale to a farmer, who wanted some turnips to finish that fattening of 20 weathers: he refused to buy them by measure; but offered me 3d. a week *per* head, to eat them on the land. I accepted it. Before the sheep went in, I measured three perches, in the best, worst, and middling parts of the road.

	Cwt.	qr.	lb.
N <sup>o</sup> 1. weighed topped and tailed,	2	0	0
2. " " " " " " " "	1	3	14
3. " " " " " " " "	1	3	0

Average, 1 cwt. 3 qr. 14 lb. which is *per* acre, 15 tons: and on the road, 3 tons, 15 cwt. The sheep were turned in the 11th of September, and the road failed them rather better than five days; consequently paid 3s. 9d. at 5s. a week.

	EXPENCES.	£.	s.	d.
Six ploughings,	- - - - -	0	1	6
Harrowing,	- - - - -	0	0	1½
Manuring,	- - - - -	0	2	10
Drilling,	- - - - -	0	0	0½
Seed,	- - - - -	0	0	1½
Two hand hoeings,	- - - - -	0	1	3
Four horse hoeings,	- - - - -	0	0	8
		0	6	6½
Rent,	- - - - -	0	4	3
		0	10	9½

	PRODUCE.	£.	s.	d.
Sheep feed,	- - - - -	0	3	9
Expences,	- - - - -	0	10	9½
Produce,	- - - - -	0	3	9
Loss,	- - - - -	0	7	0½
	M m 2			Brought

	£.	s.	d.
Brought over,	0	7	0½
	£.	s.	d.
Ploughing,	0	1	6
Harrowing,	0	0	2½
Manuring,	0	1	11
Drilling,	0	0	0½
Horse hoeing,	0	0	5
	0	4	0½
Total loss, 2l. 4s. 5d. per acre,	0	11	1½

1765.

September 19th, 1764, reversed the ridges whereon the turnips grew, and the 28th, arched them up. October 1st, drilled three rows of wheat on each ridge one foot asunder; using a peck and half of seed. The 28th of March, horse hoed for the first time, *from* the plants, throwing up a ridge in the middle of each interval. April 10th, hand hoed the rows, weeding them at the same time. May 9th, the second horse hoeing, reversing the last; and hand hoed again the latter end of the Month. June 13th, the third horse hoeing. July 8th, the fourth and last. Reaped the middle of August: produce, four bushels, two pecks.

	EXPENCES.	£.	s.	d.
Two ploughings,		0	0	6
Harrowing,		0	0	0½
Drilling,		0	0	0½
Seed,		0	1	10½
Four horse hoeings,		0	0	8
Two hand hoeings,		0	3	10
Reaping,		0	1	0
Harvesting,		0	0	6
Threshing,		0	1	1½
		0	9	7½
Rent, &c.		0	4	3
		0	13	10½

PRODUCE.						£.	s.	d.
Four and a half bushels, at 42s.	-	-	-	-	-	0	3	7½
Expences,	-	-	-	-	-	0	13	10½
Profit,	-	-	-	-	-	0	9	0

	£.	s.	d.
Ploughing,	0	0	6
Harrowing,	0	0	1
Drilling,	0	0	0½
Horſe hoeing,	0	1	7½
Carting,	0	0	1½
			<hr/> 0 2 4½
Clear profit, 1 <i>l.</i> 9 <i>s.</i> 6 <i>d.</i> per acre,	-	-	<hr/> 0 7 4½

1766:

Reverſed the ridges of the wheat of 1765, the beginning of September; and the latter end of the month, arched the new ones up; in which ſtate they were left during the winter. March 5th, ploughed them down; the 15th, arched them up again: the 17th, harrowed and drilled them with treble rows of white peaſe; uſing two pecks of ſeed. April 25th, hand hoed the rows, and then horſe hoed them, turning a furrow from the plants. May 13th, repeated the horſe hoeing; the 17th, hand hoed again; the 28th, gave the third horſe hoeing. June 18th, the fourth; but a boy went before the plough in the two laſt hoeings, to turn the branches on to the rows; the trailing of the pea ſtalks is very inconvenient in the horſe hoeings. Hooked them the 8th of Auguſt; product two buſhels and three pecks.

EXPENCES.						£.	s.	d.
Four ploughings,	-	-	-	-	-	0	1	0
Harrowing,	-	-	-	-	-	0	0	0½
Drilling,	-	-	-	-	-	0	0	0½
Seed,	-	-	-	-	-	0	2	0
Four horſe hoeings,	-	-	-	-	-	0	0	8
Turning aſide the ſtalks,	-	-	-	-	-	0	0	2
Two hand hoeings,	-	-	-	-	-	0	1	9
Hooking,	-	-	-	-	-	0	0	6
Carried over,	-	-	-	-	-	0	6	1½

Brought



Brought over,	-	-	-	-	-	-	0	2	10½
Four horse hoeings,	-	-	-	-	-	-	0	0	8
Three hand ditto,	-	-	-	-	-	-	0	3	6
Two weedings,	-	-	-	-	-	-	0	1	9
Reaping,	-	-	-	-	-	-	0	1	0
Harvesting,	-	-	-	-	-	-	0	0	9
Threshing,	-	-	-	-	-	-	0	1	0
<hr/>									
Rent, &c.	-	-	-	-	-	-	0	11	6½
	-	-	-	-	-	-	0	4	3
<hr/>									
	-	-	-	-	-	-	0	15	9½

## PRODUCE.

Two bushels, two and an half pecks, at 48s.	-	-	-	-	-	-	0	15	9
Loss,	-	-	-	-	-	-	0	0	0½
<hr/>									
	-	-	-	-	-	-	0	2	7
Ploughing,	-	-	-	-	-	-	0	1	2½
Harrowing,	-	-	-	-	-	-	0	0	2½
Drilling,	-	-	-	-	-	-	0	0	0½
Hort hoeing,	-	-	-	-	-	-	0	1	0
Caring,	-	-	-	-	-	-	0	0	1½
<hr/>									
Total loss, 10s. 6d. per acre,	-	-	-	-	-	-	0	2	7½

## RECAPITULATION.

1764, loss per acre,	-	-	-	-	-	-	2	4	5
1766, ditto,	-	-	-	-	-	-	0	14	10
1767, ditto,	-	-	-	-	-	-	0	10	6
<hr/>									
1765, profit.	-	-	-	-	-	-	3	9	9
	-	-	-	-	-	-	1	9	6
<hr/>									
Loss in four years,	-	-	-	-	-	-	2	0	3

ACCOUNT of N<sup>o</sup> III.

1764.

Ploughed up the barley stubble in November 1763, and stirred it again in March following. In April ploughed it a third time, and gave it three



three harrowings: the last week in May ploughed in many weeds, that had srole after the preceding tillage. June 9th, gave it the fifth earth, and manured it with five loads of rotten farm yard dung; the 13th, turned it in, and the 16th, harrowed in the seed, broadcast sown: the plants rising very favourably, were hand hoed the 9th of July; and for the second time the 3d of August. In December measured three perches fairly chosen in the best, worst, and middling parts of the rood, and the weights were as follows:

				Cwt.	qr.	lb.
N <sup>o</sup> 1.	-	-	-	3	3	0
2.	-	-	-	3	2	0
3.	-	-	-	3	1	7

Average, 3 cwt. 2 qrs. which is 28 tons *per* acre; and on the rood, 7 tons. In this month they were eat on the land by twenty sheep, at 3d. *per* head *per* week; and maintained them eleven days, which comes to 7s. 10d.

EXPENCES.								£.	s.	d.
Six ploughings,	-	-	-	-	-	-	-	0	1	6
Harrowing,	-	-	-	-	-	-	-	0	0	11
Manuring,	-	-	-	-	-	-	-	0	2	10
Seed,	-	-	-	-	-	-	-	0	0	3
Sowing,	-	-	-	-	-	-	-	0	0	01
Two hand hoeings,	-	-	-	-	-	-	-	0	1	7½
								0	6	4½
Rent,	-	-	-	-	-	-	-	0	4	3
								0	10	7½

PRODUCE.								£.	s.	d.
Sheep feed,	-	-	-	-	-	-	-	0	7	10
Loaf,	-	-	-	-	-	-	-	0	2	9½
								0	1	6
Ploughing,	-	-	-	-	-	-	-	0	0	2½
Harrowing,	-	-	-	-	-	-	-	0	1	11
Manuring,	-	-	-	-	-	-	-	0	1	11
								10	3	4½
Total loaf, 1l. 6s. 5d. <i>per</i> acre,	-	-	-	-	-	-	-	0	6	5

1765.

Ploughed up the turnip land the 23d of March. The 10th of April, stirred it again; and a third time, the 18th; upon which earth harrowed in one bushel of barley, and at the same time a quarter of a peck of clover seed. The weather was various till the 10th of May; but in general very showery, warm, growing weather; the barley came up very favourably, and made a good appearance. The rest of the Month in general very dry; after that came a very severe drought which stunted the growth of all crops. Mowed it the middle of August. Product, one quarter and one peck.

EXPENCES.						£.	s.	d.
Three ploughings,	-	-	-	-	-	0	0	9
Harrowing,	-	-	-	-	-	0	0	1
Seed,	-	-	-	-	-	0	2	4½
Sowing,	-	-	-	-	-	0	0	0½
Rolling,	-	-	-	-	-	0	0	0½
Mowing,	-	-	-	-	-	0	0	3½
Harvesting,	-	-	-	-	-	0	0	6
Threshing,	-	-	-	-	-	0	1	0½
						0	5	1½
Rent,	-	-	-	-	-	0	4	3
						0	9	4½

PRODUCE.						£.	s.	d.
1 qr. 1 peck, at 24s.	-	-	-	-	-	1	4	9
Expences,	-	-	-	-	-	0	9	4½
						0	15	4½
						£.	s.	d.
Ploughing,	-	-	-	-	-	0	1	9½
Harrowing,	-	-	-	-	-	0	0	2¼
Carting,	-	-	-	-	-	0	0	1½
						0	2	1½
Clear profit 2l. 13s. 1d. per acre,	-	-	-	-	-	0	13	3½

1766.

The extreme dryness of the year 1765, prevented the clover making any figure; after harvest some was to be seen, but not enough to determine then,

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 whether it had succeeded or failed. In autumn it appeared more; and in the  
 spring gave me hope of a fine regular crop. Mowed it for hay the 27th  
 of June, product 10½ cwt. which I sold the following winter for 1*l*. Sep-  
 tember 1st, cut it for hay again; heavy rain the 2d, but did not damage  
 the clover; product 9½ cwt. Sold in the winter for 13*s*.

EXPENCES.					£.	s.	d.
½ peck of seed at 20 <i>s</i> .	-	-	-	-	0	1	3
Sowing.	-	-	-	-	0	0	0½
Mowing, making, &c. twice,	-	-	-	-	0	3	6
					0	4	9½
Rent, &c.	-	-	-	-	0	4	3
					0	9	0½
PRODUCE.					£.	s.	d.
First cutting,	-	-	-	-	1	0	0
Second ditto,	-	-	-	-	0	13	0
					1	13	0
Expences,	-	-	-	-	0	9	0½
Profit,	-	-	-	-	1	3	11½
Carting,	-	-	-	-	0	0	5
Clear profit, 4 <i>l</i> . 14 <i>s</i> . 1 <i>d</i> . per acre,	-	-	-	-	1	3	6½

1767.

Ploughed up the clover lay the 21st of October; it broke in fine crum-  
 bling order; harrowed in two pecks of wheat seed; a few thistles were cut  
 once; reaped in August; the produce five bushels.

EXPENCES.					£.	s.	d.
Ploughing,	-	-	-	-	0	0	4½
Harrowing,	-	-	-	-	0	0	1½
Water furrowing,	-	-	r	-	0	0	0½
Seed,	-	-	-	-	0	3	0
Sowing,	-	-	-	-	0	0	½
Thiffling,	-	-	-	-	0	0	3
					0	3	9½
Carried over	-	-	-	-			
							Brought

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	£.	s.	d.
Brought over,	0	3	9½
Reaping,	0	1	3
Harvesting,	0	0	6
Threshing,	0	1	10½
	0	7	6½
Rent,	0	4	3
	0	11	9½

## PRODUCE.

	£.	s.	d.
Four bushels, at 47s.	1	3	6
One ditto, at 40s.	0	5	0
	1	8	6
Expences,	0	11	9½
Profit,	0	16	8½
	£.	s.	d.
Ploughing,	0	0	7½
Harrowing,	0	0	5½
Carting,	0	0	1½
	0	1	2½
Clear profit, 3l. 2s. 2d. per acre,	0	15	6½

## GENERAL VIEW OF THIS EXPERIMENT.

### PROPORTIONS, per ACRE.

Nº 1, Drill husbandry; wheat every year.

Crops.	Expences.	Product.	Prod. Cash.	Profit and Loss.
	£. s. d.	qrs. bush.	£. s. d.	£. s. d.
764, fallow,	- 5 13 2	3 2	- 6 16 6	Profit 1 3 4
765, wheat,	- 3 14 7	1 5	- 3 18 0	Profit 0 3 5
766, wheat,	- 3 17 10	1 1	- 2 14 0	Loss 1 3 10
767, wheat,	- 3 17 10	1 1	- 2 14 0	Loss 1 3 10
Totals,	- 13 5 7	7 0	- 13 8 6	Profit 0 2 11
Average,	* 3 6 4½	2 2½	4 9 6½	* 0 0 8½

\* Averages of four years.

† Ditto of three years. Average product of four years, 3l. 7s. 1½d.

N n. 2

Nº

N<sup>o</sup> 2, Drill Husbandry ; different Crops.

	Expences.			Produet.	Produet. Cash.			Profit and Loss.			
	£.	s.	d.		£.	s.	d.	£.	s.	d.	
1764, turnips, -	2	19	5	15 tons -	0	15	0	Loss,	2	4	5
1765, wheat, -	3	5	0	2 qrs. 2 bush.	4	14	0	Profit,	1	9	6
1766, pease, -	3	1	7	1 qr. 3 bush.	2	6	9	Loss,	0	14	10
1767, wheat, -	3	13	6	1 qr. 2½ bush.	3	3	0	Ditto,	0	10	6
<hr/>					<hr/>				<hr/>		
Totals, -	12	19	6		10	18	9	Loss,	2	0	3
<hr/>					<hr/>				<hr/>		
Average, -	3	4	11½	-	2	14	8¼		0	10	0½

N<sup>o</sup> 3, Broadcast Husbandry.

	£.	s.	d.		£.	s.	d.		£.	s.	d.
1764, turnips, -	2	17	0	28 tons -	1	11	4	Loss,	1	6	5
1765, barley, -	2	5	11	4 qrs. 1 bush.	4	19	0	Profit,	2	13	1
1766, clover, -	1	17	11	3 ton 19 cwt. -	6	12	0	Profit,	4	14	1
1767, wheat; -	2	11	10	2 qrs. 4 bush. -	5	14	0	Profit,	3	2	2
Totals, -	9	12	8	-	18	16	4	Profit,	9	2	11
Average, -	2	8	2	-	4	14	1		2	5	8½

## COMPARISON.

## EXPENCES.

	£.	s.	d.
Average <i>per annum</i> , drill husbandry ; wheat every year, -	3	6	4½
Ditto drill husbandry ; different crops, -	3	4	11½
Superiority of the latter, -	0	1	5½
Wheat every year, -	3	6	4½
Broadcast husbandry, -	2	8	2
Superiority of the latter, -	0	18	2½
Drill husbandry, different crops, -	3	14	11½
Broadcast husbandry -	2	8	2
Superiority of the latter -	0	16	9½

## PRODUCE.

PRODUCE.				£.	s.	d.
Broadcast, average <i>per annum</i> , of four years,	-	-	-	4	14	1
Drill husbandry; wheat every year, average <i>per ann.</i> 4 years,	-	-	-	3	7	1½
Superiority of the former	-	-	-	1	6	11½
Broadcast, average of four years,	-	-	-	4	14	1
Drill husbandry, change of crops ditto,	-	-	-	2	14	8½
Superiority of former,	-	-	-	1	19	4½
Drill husbandry; wheat every year	-	-	-	3	7	1½
Ditto, different crops,	-	-	-	2	14	8½
Superiority of the former,	-	-	-	0	12	5½
PROFIT AND LOSS.				£.	s.	d.
Broadcast; average profit <i>per annum</i> ,	-	-	-	2	5	8½
Drill husbandry; wheat every year ditto,	-	-	-	0	0	8½
Superiority of the former,	-	-	-	2	5	0
Broadcast profit,	-	-	-	2	5	8½
Drill husbandry, different crops; loss,	-	-	-	0	10	0½
Superiority of the former,	-	-	-	2	15	9½

## OBSERVATIONS.

This experiment is absolutely decisive; comparisons may be drawn up between the old and new husbandry, from the various culture of different fields; but unless a perfect similarity respecting soil, time, &c. be observed, no conclusions can be drawn from them. I have had during these years, many crops of all sorts, in both cultures, much better than any of these; I have had many others much worse but their result cannot be compared, because the respective operations were not executed with an eye to the comparison. It clearly appears, that under the circumstances of this comparison, the common husbandry is infinitely superior to the drill culture: also, that the mode of drilling wheat every year, is much better than changing the crops in the manner above-mentioned; notwithstanding a year's fallow is charged to the one and not to the other.

That the superiority of the broadcast, to the drilled, wheat every year, is not owing to the expence of a fallow on the latter, and not on the former, clearly

clearly appears, from the first drilled crop being far more profitable than any of the rest: if the fallow is struck out, and only the two last crops is taken, the superiority of the broadcast will be much greater.

I should remark, that the broadcast husbandry here practised is very good; it is the common practice of our best farmers on their gravelly loams: I have pursued it with equal profit over whole fields, but I have practiced a much worse husbandry in many others; such variations might be expected in the culture of many acres. The course of 1<sup>o</sup> turnips, 2<sup>o</sup> barley, 3<sup>o</sup> clover, 4<sup>o</sup> wheat, is good: manuring for the turnips, and feeding them on the land, ensures great crops during the rest of the course, as our best husbandmen always experience. I do not think a better system for these soils can be discovered: but on the other hand, the drill culture, with change of crops, enjoys the same advantage, without, however, making the same return; the turnip crop being much inferior, does not improve the land equally, and clover not being possible, the most profitable crop is lost, and also the most profitable preparation for wheat. I know not on this soil another drill course that promised fairer.

Gentlemen who on different soils, and with different plants, have succeeded better, may start their objections; doubtless, more skilful practitioners of the new husbandry may have ground for objections; but I request them, at the same time, to calculate the circumstances, and see if they will equal the great superiority here noted of the common method; if their soil is better, then the broadcast crops would be proportionably greater.

It appears, that both the modes of drilling, are more expensive than the common method, by 16s. or 18s. *per ann.* which is the amount of a rent: this is a considerable disadvantage, when the profit is not proportioned. The broadcast husbandry, is just sixty times as beneficial as drilled wheat, every year on the same land. Suppose the fee simple to be thirty years purchase, the worth *per acre*, is 25*l.* 10s. the superiority *per acre, per annum*, of the old husbandry, 2*l.* 5s. consequently the superior profit of it, more than equals the fee simple in twelve years. The drill culture, with a change of crops being inferior to wheat every year, the superiority of the old is of course much greater.

In such a comparison, the general cast of the season should not be forgotten. The year 1764, was inclinable to wet; 1765, remarkably dry; 1766, and 1767, as remarkably wet: advantages or disadvantages, may have arisen from this circumstance to both cultures, but the equilibrium between the three is perfect, nor did the management of the crops occasion the superiority being on the side of the old husbandry. The strongest circumstances in the character of these seasons were 1765 being remarkably unfavourable to turnips, and very favourable to wheat, and 1766 and 1767 being in general unfavourable to corn; from which it appears, that the drilled had the advantage, both being wheat in 1765.

In one particular, this trial is not complete; the value of the straw and chaff is not carried to account; this was owing partly to neglect, and partly to the difficulty of valuing it accurately: but it is not of consequence, as the certainty of the advantage being on the side of the broadcast is indubitable, it could therefore only strengthen the preceding arguments.

EXPERIMENT, N<sup>o</sup> 2.

Culture, expences, and produce of three roods, field L\*, 1764, &c.

## CULTURE.

Marked these roods in three divisions, for the comparison of three modes of culture. N<sup>o</sup> 1. Horse hoed wheat every year. N<sup>o</sup> 2, Different crops horse hoed. N<sup>o</sup> 3, The broadcast husbandry. The soil of the three as similar as possible. In 1763 they yielded barley, the stubble of which was ploughed up in autumn.

ACCOUNT OF N<sup>o</sup> 1.

1764.

Ploughed up the barley stubble in autumn, 1763. In April 1764, gave it two spring earths, and harrowed it twice. The first week in June, stirred it for the fourth time, which killed many weeds by burying them. Gave it one earth more in July, and another in August, which threw it on to five feet ridges. The beginning of September manured with five loads of rotten farm yard dung, which was turned in and the ridges arched up by the seventh earth: harrowed them once, and drilled on the top of each ridge, three rows of wheat with a peck and half of seed, one foot asunder; the intervals being three feet wide.

1765.

The young wheat made a favourable appearance through the spring; being of a fine healthy colour; the effect of such good tillage and the manure. Horse hoed it for the first time the 10th of April, turning a furrow on the way, and throwing up a small ridge in the middle of each interval; and soon after hand hoed the rows with small hoes, weeding them at the same time. May 9th, gave the second horse hoeing contrary to the first, after which another hand hoeing was given; the weather being upon the whole very dry, these operations seemed to have a good effect. The week in June, gave the third horse hoeing, again for the fourth and last



last time, the beginning of July; which operation left the ridges in their first form: a drier season than this was scarcely ever known, and the effect was favourable to the horse hoed wheat, for it carried a beautiful appearance throughout. Reaped the latter end of August; produce five bushels, three pecks.

## EXPENCES.

	£.	s.	d.
Seven ploughings,	0	1	9
Harrowing,	0	0	1½
Waterfallowing,	0	0	6
Manuring,	0	2	10
Drilling,	0	0	0¼
Seed,	0	1	10½
Four horse hoeings,	0	0	8
Two hand ditto,	0	4	0
Reaping,	0	1	0
Harvesting	0	0	8
Threshing,	0	1	4
	0	14	9½
Rent, &c.	0	8	6
	1	3	3½

## PRODUCE.

	£.	s.	d.
Five bushels, three pecks, at 42s.	1	10	2¼
Expences,	1	3	3½
Profit,	0	6	10½

	£.	s.	d.
Ploughing,	0	1	9
Harrowing,	0	0	2½
Manuring,	0	1	11
Drilling,	0	0	0¼
Horse hoeing,	0	1	7½
Carting,	0	0	0
	0	5	7½
Clear profit, 4s. 11d. per acre,	0	1	2½

1766.

In order to drill the land again with wheat, the stubble of the preceding crop was chopt, raked together and carried off; and the beds were then re-verfed and arched up by two ploughings; harrowed them twice, and drilled them the 23d of September as before, three rows at one foot, with a peck and half of feed. The beginning of March, gave the first horse hoeing, the season much finer than common at that time, and then sowed the water furrows; hand hoed the rows also. The latter end of April, gave the second horse hoeing; the 17th of May, the third; the 28th, hand hoed again, weeding at the same time. After this, the wheat received another horse hoeing another hand ditto and also a weeding: all which operations were necessary to keep it clean in so wet a season; for the weeds came up incessantly. Reaped the last week in August; produce 2 bushels and three pecks.

## EXPENCES.

	£.	s.	d.
Chopping and clearing away the stubble,	0	1	3
Ploughings, - - - - -	0	0	6
Harrowing, - - - - -	0	0	0½
Drilling, - - - - -	0	0	0½
Seed, - - - - -	0	1	11½
Waterfallowing, - - - - -	0	0	2½
Horse hoeing, - - - - -	0	0	8
Three hand hoeings - - - - -	0	3	6
Weeding, - - - - -	0	1	0
Reaping, - - - - -	0	1	0
Harvesting - - - - -	0	0	8
Threshing, - - - - -	0	1	0
	<hr/>		
	0	11	10½
Rent, - - - - -	0	4	0
	<hr/>		
	0	16	1½

## PRODUCE.

Two bushels, three pecks, at 46s.	0	15	9½
Loss, - - - - -	0	0	3½
	<hr/>		
	£.	s.	d.
Ploughing, - - - - -	0	1	2½
Harrowing, - - - - -	0	0	2½
Drilling, - - - - -	0	0	0½
Horse hoeing, - - - - -	0	1	0
Carting, - - - - -	0	0	1½
	<hr/>		
	0	2	6½
Total loss, 11s. 6d. per acre.	0	2	10½
	<hr/>		
	0	0	

1767.

Cut and carried off the stubble as before, the first week in September; reversed the ridges, and arched them up by two ploughings; harrowed and drilled them the 15th, with treble rows of wheat at one foot asunder, using a peck and half of seed. The middle of April, hand hoed the rows; the 27th horse hoed them. The middle of May, hand hoed again. June the 5th, the second horse hoeing; and before the expiration of the month, two more, with another hand hoeing. And the beginning of July weeded it. Reaped the last week in August; produce two bushels and half a peck.

## EXPENCES.

	£.	s.	d.
Cutting and carting the stubble,	0	1	3
Two ploughings,	0	0	6
Harrowing,	0	0	0½
Drilling,	0	0	0½
Seed,	0	2	3
Waterfallowing,	0	0	3
Four horse hoeings,	0	0	8
Three hand hoeings,	0	3	9
Two weedings,	0	1	6
Reaping,	0	1	0
Harvesting,	0	1	0
Threshing,	0	0	10
	0	13	1½
Rent, &c.	0	4	3
	0	17	4½

## PRODUCE.

Two bushels and half peck, at 4s.	0	12	9
Loss,	0	4	7½
	£.	s.	d.
Ploughing,	0	1	2½
Harrowing,	0	0	2½
Drilling,	0	0	0½
Horse hoeing,	0	1	0
Carting,	0	0	1½
	0	2	7
Total Loss, 1l. 8s. 10d. per acre,	0	7	2½

## RECAPITULATION

	£.	s.	d.
1766, loss per acre,	0	11	6
1767, ditto,	1	8	10
	<hr/>		
1764 and 1765, profit,	2	0	4
	0	4	11
	<hr/>		
Loss on four years,	1	15	5
	<hr/>		

ACCOUNT of N<sup>o</sup> 2.

1764.

In the autumn of the preceding year ploughed up the barley stubble on to three feet ridges, and water-furrowed it; reversed the ridges the beginning of March, and manured them with five load of rotten farm yard dung; and the last week of the same month arched them up, harrowed them, and drilled each with a double row of common horse beans, one foot asunder, using a peck and half of seed. The plants came up very strong and regularly; gave a thorough hand hoeing to the rows as soon as the young beans were four inches high, cutting up all weeds of which there were many; loosening the earth and thinning the plants where crowded. Horse hoed them the 17th of May, turning a furrow from the rows, and throwing up a small ridge in the middle of each interval. Hand hoed them again the second of June; the 8th, gave the second horse hoeing; the 20th, another hand hoeing; the 26th, horse hoed again. July 6th, the fourth and last horse hoeing. Reaped the first week in September; produce ten bushels.

## EXPENCES.

	£.	s.	d.
Three ploughings,	0	0	9
Manuring,	0	2	10
Harrowing,	0	0	0½
Water-furrowing thrice,	0	0	6
Drilling,	0	0	1
Seed,	0	1	3½
Four horse hoeings,	0	0	9
Three hand hoeings,	0	2	6
Reaping,	0	1	0
Harvesting,	0	1	0
Threshing,	0	1	3
	<hr/>		
Carried over,	0	12	0½
O o 2	<hr/>		
	Brought		

						£.	s.	d.
Brought over,	-	-	-	-	-	0	12	0½
Rent, &c.	-	-	-	-	-	0	4	3
						0	16	3½
PRODUCE.						£.	s.	d.
1qr. 2 bush. at 26s.	-	-	-	-	-	1	12	6
Expences,	-	-	-	-	-	0	16	3½
Profit	-	-	-	-	-	0	16	2½
						£.	s.	d.
Ploughing,	-	-	-	-	-	0	1	1½
Harrowing,	-	-	-	-	-	0	0	0½
Manuring	-	-	-	-	-	0	1	11
Drilling,	-	-	-	-	-	0	0	0½
Horse hoeing,	-	-	-	-	-	0	0	6
Carting,	-	-	-	-	-	0	0	0½
						0	3	8½
Clear profit, at 2l. 10s. 1d. per acre,	-	-	-	-	-	0	12	6½

1765.

The middle of September, ploughed down the bean ridges, and harrowing the land flat across, threw it on to three feet ones, and arched them up: this was effected by four ploughings. The 28th, drilled them with treble rows of wheat at one foot, using a peck and half of seed. The end of march, gave the first horse hoeing; and hand hoed the rows the 10th of April. In May gave two more horse hoeings and another hand hoeing. Horse hoed the third and last time, the 13th of June. Reaped the middle of August; produce, five bushels.

EXPENCES.						£.	s.	d.
Four ploughings,	-	-	-	-	-	0	1	0
Harrowing,	-	-	-	-	-	0	0	1½
Drilling,	-	-	-	-	-	0	0	0½
Water furrowing,	-	-	-	-	-	0	0	2
Seed,	-	-	-	-	-	0	1	10½
Carried over						0	3	1½
						Brought		

	£.	s.	d.
Brought over,	0	3	11
Four horse hoeings,	0	0	8
Two hand hoeing,	0	4	0
Reaping,	0	1	0
Harvesting,	0	0	6
Threshing,	0	1	3
	0	10	7½
Rent, &c,	0	4	3
	0	14	10½

## PRODUCE.

	£.	s.	d.
Five bushels at 42s.	1	6	3
Expences	0	14	10½
	0	11	4½

	£.	s.	d.
Ploughing,	0	1	0
Harrowing,	0	0	2
Drilling,	0	0	0½
Horse hoeing,	0	1	7½
Carting,	0	0	1½
	0	2	11½
Clear profit, 1l. 13s. 7d. per acre	0	8	4½

1766.

In September, reversed the wheat ridges, and water-furrowed for the winter. The first week in March, the weather being very fine, arched them up and drilled them, each with three rows of tick beans, one foot asunder, using two pecks of seed, and water-furrowed again. My intention was to reverse the winter ridges, and then arch up and drill; but fearing delays, if I missed so good a season, I changed my mind, and threw in the seed as soon as possible. May 17th, horse hoed the ridges; the 28th, hand hoed the rows, thinning the plants where too thick. The first week in June, gave the second horse hoeing; the 18th hand hoed again; repeated the horse hoeing twice more; the last leaving the ridges in their first form; also hand hoed them again and cut off the tops of the beans when they began to blossom. Reaped the beginning of September; produce, eight bushels.

EXPENCES.						£.	s.	d.
Two ploughings,	-	-	-	-	-	0	0	6
Harrowing,	-	-	-	-	-	0	0	0½
Water-furrowing,	-	-	-	-	-	0	0	4½
Drilling,	-	-	-	-	-	0	0	0½
Seed,	-	-	-	-	-	0	2	1½
Four horse hoeings,	-	-	-	-	-	0	0	8
Three hand hoeings,	-	-	-	-	-	0	4	0
Cutting the tops,	-	-	-	-	-	0	0	6
Reaping,	-	-	-	-	-	0	1	0
Harvesting,	-	-	-	-	-	0	1	0
Threshing	-	-	-	-	-	0	1	0
						0	11	3½
Rent, &c.	-	-	-	-	-	0	4	3
						0	15	6½
PRODUCE.						£.	s.	d.
Eight bushels, at 32s.	-	-	-	-	-	1	12	0
Expences,	-	-	-	-	-	0	15	6½
Profit,	-	-	-	-	-	0	16	5½
						£.	s.	d.
Ploughing,	-	-	-	-	-	0	1	2½
Harrowing,	-	-	-	-	-	0	0	2½
Drilling,	-	-	-	-	-	0	0	0½
Horse hoeing,	-	-	-	-	-	0	1	0
Carting,	-	-	-	-	-	0	0	1½
						0	2	6½
Clear profit, 2l. 15s. 7d. per acre.	-	-	-	-	-	0	13	10½

1767.

The 15th of September reversed the bean ridges, and in a few days after arched up the new ones and drilled them with treble rows of wheat, one foot asunder, and water-furrowed them. April 11th, hand hoed the rows, the 27th horse hoed, hand hoed them again the middle of May, three more horse hoeings, and another hand hoeing in June. Reaped the last week in August; produce one bushel and three pecks.

EXPENCES.

## EXPENCES.

	£.	s.	d.
Two ploughings,	0	0	6
Harrowing,	0	0	0 $\frac{1}{2}$
Water-furrowing,	0	0	4
Drilling,	0	0	0 $\frac{3}{4}$
Seed,	0	2	3
Four horse hoeings,	0	0	8
Three hand ditto,	0	3	6
Reaping,	0	0	9
Harvesting,	0	0	9
Threshing,	0	0	9

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 0 9 7 $\frac{1}{2}$ 

Rent, &c.	0	4	3
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 0 13 10 $\frac{1}{2}$ 

## PRODUCE.

1 bush. 3pecks, at 48s.	0	10	6
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Loss,	0	3	4 $\frac{1}{2}$
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	£.	s.	d.
Ploughing,	0	1	2 $\frac{1}{2}$
Harrowing,	0	0	2 $\frac{1}{4}$
Drilling,	0	0	0 $\frac{1}{4}$
Horse hoeing,	0	1	0
Carting,	0	0	1 $\frac{1}{2}$

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 0 2 7

Total loss, 1l. 3s. 10d. per acre	0	5	11 $\frac{1}{2}$
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## RECAPITULATION.

	£.	s.	d.
1764, profit per acre,	2	10	1
1765, ditto,	1	13	7
1766, ditto,	2	15	7

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 6 19 3

1767, loss	1	3	10
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 5 15 5

Profit in four years,	5	15	5
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Account of N<sup>o</sup>. 3.

1764.

Ploughed the barley stuble in the autumn of the preceding year on to the common three feet ridges; and water-furrowed it. Stirred it again the beginning of March, and manured with five loads of rotten farm yard dung; the last week of the same month, drew the ridges into baulks; (that is half ploughed them) then sowed two pecks of horse beans, broadcast, and covered them by shutting up the baulks, thereby completing new ridges; in which method no seed is lost in the furrows. As soon as the plants were four or five inches high, they were hand hoed in the common manner with nine inch hoes; the weeds all cut up; the ground well loosened and the beans left single. After which the men went over them again to rectify all former omissions, and left the crop in clean garden order. This was all the culture they had. Reaped the beginning of September; produce one quarter one bushel.

	EXPENCES.	£.	s.	d.
Three ploughings,	- - - - -	0	0	9
Manuring,	- - - - -	0	2	10
Harrowing,	- - - - -	0	0	0½
Water-furrowing,	- - - - -	0	0	3
Seed,	- - - - -	0	1	9
Sowing,	- - - - -	0	0	0½
Twice hand hoeing,	- - - - -	0	2	3
Reaping,	- - - - -	0	1	3
Harvesting,	- - - - -	0	1	3
Threshing,	- - - - -	0	1	1½
		0	11	6½
Rent, &c.	- - - - -	0	4	3
		0	15	9½

	PRODUCE.	£.	s.	d.
1 qr. 1 bush. at 26s.	- - - - -	1	9	3
Expences,	- - - - -	0	15	9½
Profit,	- - - - -	0	13	5½
				Brought

					£.	s.	d.
Brought over,	-	-	-	-	0	13	5½
					£.	s.	d.
Ploughing,	-	-	-	-	0	1	1½
Harrowing,	-	-	-	-	0	0	0½
Manuring,	-	0	-	-	0	1	1½
Carting,	-	-	-	-	0	0	8
						0	3
							2
Clear profit, 2s. 1d. per acre,	-	-	-	-	0	10	3½

1766.

Ploughed up the bean stubble in October; throwing the land again into ridges, and water-furrowing it. Gave it the first spring earth the 23d of March, and the second the 10th of April; each time on the ridge harrowed them down, and sowed one bushel of barley, and a quarter of a peck of clover seed, covering both by three more harrowings; and then water-furrowed again. The barley came up favourably and flourished well through the spring; and although the summer was a continued drought, yet it held tolerably well to its appearance, but the straw short. The clover was scarcely to be seen. Mowed the middle of August; produce six bushels two pecks.

	EXPENCES	£.	s.	d.
Three ploughings,	- - - - -	0	0	9
Harrowing,	- - - - -	0	0	2
Water-furrowing,	- - - - -	0	0	4½
Seed,	- - - - -	0	2	4½
Sowing,	- - - - -	0	0	0½
Rolling,	- - - - -	0	0	0½
Mowing,	- - - - -	0	0	3½
Harvesting,	- - - - -	0	0	6
Threshing,	- - - - -	0	0	10
			5	4½
rent,	- - - - -	0	4	3
			9	7½

## PRODUCE.

	£.	s.	d.
Six bushels and two pecks, at 24s.	0	19	6
Expences,	0	9	7½
Profit,	0	9	10½
	£.	s.	d.
Ploughing,	0	1	9½
Harrowing,	0	0	5½
Carting,	0	0	1½
	0	2	4½
Clear profit, 1l 10s. per acre,	0	7	6

1767.

Mowed the clover for hay, a full crop the last week in June: produce 11 cwt. fold for 1l. 1s. The first week in September cut it again for hay; produce 11 cwt. fold for 14s.

## EXPENCES.

	£.	s.	d.
¼ peck of feed at 20s.	0	1	3
Sowing,	0	0	0½
Mowing, making, &c, &c. twice,	0	3	6
	0	4	9½
Rent, &c.	0	4	3
	0	9	0½

## PRODUCE.

	£.	s.	d.
First cutting,	1	1	0
Second ditto,	0	14	0
	1	15	0
Expences,	0	9	0½
Profit,	2	5	11½
Carting,	0	0	5
Clear profit, 5l. 2s. 1d. per acre,	1	5	6½

1767.

1767.

Ploughed up the clover lay for wheat the 21st of October; harrowed in half a bushel of wheat feed; once thiftled. Reaped in August; produce, four bushels.

EXPENCES.							£.	s.	d.
Ploughing,	-	-	-	-	-	-	0	0	4½
Harrowing,	-	-	-	-	-	-	0	0	1½
Water furrowing,	-	-	-	-	-	-	0	0	3
Seed,	-	-	-	-	-	-	0	3	0
Sowing,	-	-	-	-	-	-	0	0	0½
Thiftling,	-	-	-	-	-	-	0	0	3
Reaping,	-	-	-	-	-	-	0	1	0
Harvesting,	-	-	-	-	-	-	0	0	6
Threshing,	-	-	-	-	-	-	0	1	4
							0	6	11
Rent,	-	-	-	-	-	-	0	4	3
							0	11	2

PRODUCE.							£.	s.	d.
Four bushels, at 48s.	-	-	-	-	-	-	1	4	0
Expences,	-	-	-	-	-	-	0	11	2
							0	12	10

							£.	s.	d.
Ploughing,	-	-	-	-	-	-	0	0	7½
Harrowing,	-	-	-	-	-	-	0	0	5½
Carting,	-	-	-	-	-	-	0	0	1½
							0	1	2½
Clear profit, 2l. 6s. 7d. per acre,	-	-	-	-	-	-	0	11	7½

## RECAPITULATION.

							£.	s.	d.
1765 profit per acre,	-	-	-	-	-	-	2	1	1
1765 ditto,	-	-	-	-	-	-	1	10	0
1766 ditto,	-	-	-	-	-	-	5	2	1
1767 ditto,	-	-	-	-	-	-	2	6	7
Profit in four years,	-	-	-	-	-	-	10	19	9

## GENERAL VIEW OF THIS EXPERIMENT.

N<sup>o</sup> 1. Drill husbandry; Wheat every year.

Crops.	Expences.	Product.	Prod. Cash.	Profit and Loss.
	£. s. d.		£. s. d.	£. s. d.
1764, fallow, }	5 15 10	2 qrs. 7 bush.	6 0 9	Profit 0 4 11
1765, wheat, }				
1766, wheat, -	3 14 9	1 qr. 3 bush.	3 3 3	Loss 0 11 6
1767, wheat, -	3 19 10	1 qr. 2 pecks	2 11 0	Loss 1 8 10
Totals, -	13 10 5		11 15 0	Loss 1 15 5
Averages, -	3 7 7		* 3 18 4	- 0 8 10

N<sup>o</sup> 2. Drill Husbandry; different crops.

Crops.	Expences.	Product.	Prod. Cash.	Profit and Loss.
	£. s. d.		£. s. d.	£. s. d.
1764, beans, -	3 19 11	5 qrs.	6 10 0	Profit 2 10 1
1765, wheat, -	3 11 3	2 qrs. 4 bush.	5 5 0	Profit 1 13 7
1766, beans, -	3 12 5	4 qrs.	6 8 0	Profit 2 15 7
1767, wheat -	3 5 10	7 bush.	2 2 0	Loss 1 3 10
Totals, -	14 9 5		20 5 0	Profit 5 15 5
Averages, -	3 12 4		5 1 3	- 1 8 10

N<sup>o</sup> 3. Broadcast Husbandry.

Crops.	Expences.	Product.	Prod. Cash.	Profit and Loss.
	£. s. d.		£. s. d.	£. s. d.
1764, beans, -	3 15 11	4 qrs. 4 bush.	5 17 0	Profit 2 1 1
1765, barley, -	2 8 0	3 qrs. 2 bush.	3 18 0	Profit 1 10 0
1766, clover. -	1 0 11	4 ton 8 cwt.	7 0 0	Profit 5 2 1
1767, wheat, -	2 9 5	2 qrs.	4 16 0	Profit 2 6 7
Totals -	9 14 3	-	21 11 0	Profit 10 19 9
Averages, -	2 8 6	-	5 7 9	- 2 14 11

\* Average of four years, 2l. 18s. 9d.

COMPARISON.

## COMPARISON

## EXPENCES.

	£.	s.	d.
Average <i>per ann.</i> drill husbandry, different crops	3	12	4
Ditto, drill husbandry, wheat every year,	3	7	7
Superiority of the latter,	0	4	9
Average, drill husbandry, different crops,	3	12	4
Average, broadcast husbandry	2	8	6
Superiority, of the latter,	1	3	10
Average, drill husbandry, wheat every year,	3	7	7
Ditto, broadcast,	2	8	6
Superiority of the latter;	0	19	1

## PRODUCE.

	£.	s.	d.
Average <i>per ann.</i> of broadcast husbandry,	5	7	9
Ditto of drill husbandry, different crops,	5	1	3
Superiority of the former,	0	6	6
Average of broadcast	5	7	9
Ditto of drill husbandry, wheat every year,	2	18	9
Superiority of former,	2	9	0
Average of drill husbandry, different crops,	5	1	3
Ditto, wheat every year,	2	18	9
Superiority of the former,	2	2	6

## PROFIT and LOSS:

	£.	s.	d.
Average profit <i>per ann.</i> on broadcast husbandry,	2	14	11
Ditto on drill husbandry, different crops,	1	8	10
Superiority, of the former,	1	6	1
Average of broadcast husbandry,	2	14	11
Ditto of drill husbandry, wheat every year,	0	8	10
Superiority of the former,	2	6	1
Average,			

	£.	s.	d.
Average of drill husbandry, different crops,	1	8	10
Ditto of ditto, wheat every year,	0	8	10
Superiority of the former,	1	0	0

## OBSERVATIONS.

Nothing can be clearer than the result of this trial, for the time of its duration. Had I continued longer on the farm, I should have continued this comparison, and the greater the number of years, the more authentic the register; because it would have included the greater variety of seasons; but this circumstance does not invalidate the register of these four years, or even weaken its force, no more than the imaginary existence of a perfect trial destroys the utility of an imperfect one. The common husbandry is greatly superior to both methods of drilling; which superiority it owes to the great profit of the clover; the clover preparation for wheat, and the lowness of the expences. The crop of clover here registered, though by no means uncommon, was much better than many I had that year; but as the comparison with the other roads was perfectly fair and equal, I do not see that any allowances should on that account be made, and especially as the parallel shews, that the superiority of the broadcast is not in *product*, but profit. The drilled different crops come within 6s. 6d. of it in the first, but are 26s. behind in the second: from whence it clearly appears that the great products are not the point; but the general balance of the whole account, all expences deducted. And I think the success of the different crops drilled proportionably, as great as any one may think that of the broadcast road. This has been owing to my fortunately practising a course that is certainly a good one, which was the result of a design of comparing the methods on this soil under as many crops, different from those I used on gravel, as I could. Had drilled pease, oats, or barley been introduced, the result would have been very different: the fixing on beans, which agree so remarkably well with the horse hoeing culture, has given the utmost advantage to that mode.

I may here further observe, that the broadcast course is, I apprehend, an excellent one: it is the common practice of a most excellent farmer of my acquaintance who has made a little fortune by it. I can easily conceive some alterations that would have given the drill culture the superiority; for instance, suppose the wheat had followed the beans, the case would at once have been altered.

The superiority of the drilled change of crops, over drilled wheat every year is striking, and results from the introduction of beans; the profit of which in the new husbandry is so manifest.

The broadcast culture is much cheaper than either of the other methods; which, considering its superiority, is a matter of consequence.

The value of the straw in these methods is not carried to account: it would add to the superiority of the common husbandry, but the exact amount cannot be ascertained.

### GENERAL OBSERVATIONS.

In both these experiments, which include clayey loam and gravelly loam, the first striking point is the superiority of the common husbandry.

	£.	s.	d.
Superiority of profit <i>per annum</i> on gravel, over drilled wheat every year,	-	2	5 0
Ditto on clay,	-	2	6 1
Superiority to the drilled change of crops on gravel,	-	2	15 9½
Ditto on clay,	-	1	6 1

The change of drilled crops on the clayey loam comes nearest to the broadcast; but on the gravelly, the wheat every year is preferable to the change. The drill culture on clay is upon the whole preferable to that on gravel, which is owing to the drilled crops of beans, being so much better than those of turnips and pease.

It should also be in general remarked, that the broadcast husbandry on both soils, with which the drill culture is compared, is extremely good, much better than the general run of the farmers husbandry. Turnips, barley, clover, wheat on gravel; and beans, barley, clover, wheat on clay, are excellent courses; they may almost be called an improved culture, but I know not any one there would have been in comparing the new method to a bad old one. The profit of a change of drill crops on clay, is 1*l.* 8*s.* 10*d.* *per acre per ann.* I am very confident the *common* husbandry does not equal this; and I will explain what I mean by common husbandry: suppose the course had been fallow, wheat, fallow wheat; or fallow, wheat barley or oats; or fallow wheat, beans, barley; or beans, wheat, barley clover; or in short many others; with such changes the drill culture would have turned out superior on the clay.

And at the same time that I remark the excellency of the common course here used, it is but fair to observe that the drilled roods had equal advantages. Beans, wheat, beans, wheat, is a very good course; for had



had barley, oats, or pease been thrown in but once, the profit would have sunk prodigiously; nor do I know how the loss on the gravel could have been lessened by a change of course for turnips, wheat, pease, wheat, on that soil is certainly good. Pease it is true are a bad drill crop, but then a good (common) one could not there have been substituted.

Supposing uncommon crops introduced on both soils; still I think the change would have been in favour of the old husbandry; on gravel it would most undoubtedly, carrots introduced instead of turnips would have increased the profit immensely; and could not be in the drill culture, because no plough will shed them\*. Four running crops of carrots broadcast, would, I will venture to assert, exceed all the courses upon earth: potatoes may be drilled, but broadcast would excel. On clay I know of no plant but cabbages that could be substituted; which certainly *may* be planted promiscuously; but would, I should apprehend, be much inferior to rows, but what proportional effect they would have on the course, is not to be ascertained; if they were admitted in the new method and rejected in the old, the former would therein have a superiority.

But perhaps the most useful instruction to be gained from these two experiments, is the lesson to UNITE the old and new husbandry into one course: the following table of the profit and loss on these crops of clay, will shew what I mean.

	£.	s.	d.
Wheat drilled, loss,	0	11	6
——Ditto,	1	8	10
——Ditto,	1	3	10
	3	4	2
	£.	s.	d.
——Ditto, profit,	0	4	11
——Ditto,	1	13	7
	1	18	6
Loss on five crops,	1	5	8
Average,	0	5	1
Beans drilled, profit,	2	10	6
——Ditto,	2	17	7
	5	5	13

\* Since this was written, I have seen a plough that will drill carrot seed; but it is a private gentleman's invention, and his property.

	£	s.	d.
Average,	2	12	10
Broadcast beans,	2	1	1
Barley,	1	10	0
Clover,	5	2	1
Wheat,	2	6	7

It appears from hence, that the broadcast wheat is vastly superior to the drilled; but that the drilled beans are better than the broadcast: both crops very profitable. It is therefore evident that a course should include broadcast wheat and drilled beans: but further the broadcast clover is the most advantageous crop of all, and not only from the great amount of profit, but also in being partly the cause of the broadcast wheat proving so beneficial. Our course must therefore certainly include a clover crop; one yet remains, the drill side of the question has nothing to offer; in the broadcast we find barley with 30s. an acre profit, this must be accepted not merely for the profit, but as a vehicle for the clover wherein its importance is very great. The united husbandry to be formed out of the two modes, is then as follows.

1. Drilled beans.
2. Broadcast barley,
3. ——— clover,
4. ——— wheat,

Substituting the profit of the drilled instead of the broadcast beans. These four crops pay a clear profit of 11*l*. 11*s*. 6*d*. or 2*l*. 17*s*. 11*d*. per acre, per annum, which is carrying common crops to as great a height as they are capable of attaining on this land, with no greater assistance of manure than these had. On the lighter soil the drill culture must be totally excluded.

But there remains a circumstance to speak to, which was unfusceptible of calculation in the preceding trial. In the tables of expences that of drilling charged not at what it did cost me, but what it would have cost me, had I possessed a drill plough free from the evils of Mr. Randal's. Now here arises a difficulty which I know not how to solve or calculate. The real expence of drilling is the average wear and tear of such drill ploughs as can be had; not of an ideal one which is perfect. Instead of 2*d*. 3*d*. 4*d*. &c. per acre, which is the horse alone that I have charged, my wear and tear alone came nearer to 2*s*. 6*d*. per acre; other drill ploughs may be worse for what I know; some may be better; but in the name of common sense, what encouragement has any person to engage for profit, in a culture, the implements of which are in such a state! I am answered that good drill ploughs exist? But where are they to be had? And when got, how

how do I know they will perform without such an expence in repairs as I have already sustained: Let those who make the assertion, read Mr. Randal's book: can any one speak more decisively? And I have no doubt but he spoke truth; but it was truth with the inventor of the plough, not with every man that might use it: he understood the plough better, and had greater experience in the husbandry than myself, or the supposed person I speak of at present. I think we may conclude from hence, that a considerable charge *per acre* for the expence of the plough might be made without any imputation of partiality: the preceding trials are incomplete without it: but I voluntarily left them so, rather than lay myself open to such a supposition.

If any gentleman was to bargain with me for drilling an hundred acres annually, with any plough I could procure, and to be answerable, under forfeiture of given sums that the drilling in favourable seasons should never stand still, and to be performed by farming men without myself constantly at the plough tail, I would not undertake it under half a crown an acre, for the mere drill plough.\*

\* Since the above was written, many drill ploughs have started up, with each their advocate; but from those which I have viewed, I see no reason for altering my opinion: many are very ingenious contrivances, and I have no doubt will answer greatly to persons who drill for amusement; but that they will do for others, who drill for profit, I am convinced is impossible. In a business of profit, a farmer's attention must not be ingrossed by one implement and its operations because it is a gimcrack: his head man comes to him over night to know the business of the next day: *Let the ploughs all go into the twenty acres: two pair of harrows to follow them; two others into the stoney close: the roller into the ten acres. Let the carts go to the marle pit; and the waggon to \*\*\* for dung. Let John Clarke sow after the ploughs, just a sack an acre.* Here is nothing that can be misunderstood; the business is executed without difficulty; the farmer rises in the morn to see all out in due time; he afterwards takes a ride through the fields, to see how matters go on, or lets it alone, as it happens: no accident can fall out if he is twenty miles off, but what the men know how to remedy as well as the master. But let us change the supposition; and suppose the drill culture, the farmers answer then may be, *Send four ploughs into twenty acres; let two pair of harrows follow them, and then the drill plough: observe, particularly to drill no more than five pecks of barley per acre: and—JOHN!—mind you don't drill deeper than four inches; you remember the bolt that guides that: and—bark'e—JOHN! don't forget the variation I showed you of the hook and plate, to move it obliquely thro' the transverse iron.* To be sure, JOHN may be a genius, and all may go well; but the Lord have mercy on the man who trusts his profit to the chance. The number of accidents liable in a machine, as complicated as an orrery in the hands of countrymen, must be great. The land is in fine tilth; the barley stops drilling—rain—a fortnight may be lost: practical men will easily believe such accidents probable: in the common husbandry we know them to be impossible. All such should be calculated, and the average carried to account, but that is impracticable; consequently in drilled experiments, an allowance should always be made against the mode for expences that cannot be registered.

But with drillers for pleasure, the same objections do not hold to our modern drill ploughs; the attention to the performance is an amusement; in such case these ploughs may sometimes be excellent.

Beans in the above experiments are proved to be well adapted to drilling: pity that we have not a plough for that mere purpose; to have no variations in size of seed, or depth.

EXPERIMENTAL  
AGRICULTURE.  
BOOK VIII.  
OF TILLAGE.



## B O O K VIII.

## O F T I L L A G E.

**T**ILLAGE is one of the most important objects in husbandry ; and yet it has received so little experimental attention, that it is difficult to pronounce one assertion on it, the truth of which is absolutely confirmed by experience. Had I continued longer on my farm, I should have reduced (on clayey and gravelly loam) some parts, at least, of the subject, to an accurate determination. The following experiment must be considered merely as an opening to more extensive views, which would have received a true examination, if I had possessed the opportunity I wished for ; in their imperfect state, they may be of some use in suggesting hints to others that are worthy of pursuit.

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## C H A P. I.

### Of P L O U G H I N G.

**P**REVIOUS to the insertion of the following trials, I should remark, that the tillage common in Suffolk is performed, with a small fwing plough, with only two horses, which does all sorts of work; the the general depth is about five inches.

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## S E C T. I.

### Of the T I M E of P L O U G H I N G.

**T**HIS point in tillage concerns only the ploughing up of stubbles in autumn or in spring. Suppose the number of earths equal, what is the difference between giving the first tillage before or after the winter? I had met with the subject so often handled in books of husbandry, especially in recommending strenuously the ploughing before winter, that I early thought of trying it on my land. The defence the farmers give for their conduct never satisfied me; the finding sheep feed during the winter and spring: the grand object most certainly, is the state and improvement

provement of the land for the ensuing crop. If tillage before winter is in that light more advantageous than afterwards, certainly the finding sheep feed is a very inferior object.

EXPERIMENT. N<sup>o</sup> 1.

Marked two narrow lands in field L\*, each containing ten perches: they yielded barley in 1763. Ploughed up the stubble of one in October; the other the middle of April 1764; the week following ploughed both again, and harrowed in white oats, four bushels *per* acre. Produce of that ploughed in autumn is one bushel and one quarter of a peck. Ditto of that ploughed in spring one bushel. Difference *per* acre one bushel. This superiority is too small to found any absolute conclusions on; but being on the side of the autumn tillage, and all circumstances perfectly equal, it gives one reason to suppose that method preferable to the other.

EXPERIMENT. N<sup>o</sup> 2.

Marked two lands in autumn 1763, in field M\*, each ten perches, they yielded barley that year. Ploughed up one in November; and the other in March following. Harrowed in barley on a following earth in each, all circumstances equal. Product of each, exactly a bushel and half a peck; which equality in product is a plain proof that the two seasons were of equal merit. I was somewhat surprised at the result, as the land ploughed in autumn was finer at sowing than the other; and barley is said much to affect a fine tilth.

EXPERIMENT. N<sup>o</sup> 3.

Marked in October 1764, two beds, each ten perches in field L\*, which yielded wheat that year; ploughed one on to the ridge the latter end of the month; and left the other stubble until March 1765, when it was likewise ridged: after this each received three ploughings more, and were sown with turnips; but the crop failing, I could not decide the point of tillage relative to product; but I made a remark that is perhaps of as much utility; for viewing the two pieces in May, I found that ploughed in October much fuller of weeds than the other, I believe at least a third more; which circumstance struck me: I think it proves much in favour of the autumn tillage for several reasons. A principal object in fallowing, is the destruction of weeds, and it is certainly a fact, that they can never be destroyed, unless they vegetate. Fallows for this reason ought to be made very fine by the latter end of May, that a full crop of weeds may be turned in by a June plowing. The autumn ploughing had evidently a strong tendency of this



fort, by the frosts pulverizing the land and bringing it into a proper state, for the seeds of weeds to vegetate. This single circumstance is reason sufficient for the practice. But it may not be improper at the same time to observe, that the same effect possibly might not be so advantageous for a spring crop, unless the land is quite clean; for in that case the growth of the weeds is much promoted without a succeeding opportunity of destroying them: but this is conjecture.

#### EXPERIMENT, N<sup>o</sup> 4.

In November 1764, ploughed up a bed of ten perches in field L\*; and the beginning of March following another of the same size by the side of it. About Lady Day sowed them with beans, which were twice hand hoed. Produce of the autumn ploughed one bushel, one peck: of the spring ploughed one bushel and half a peck. Superiority *per* acre, two bushels. This difference is very considerable; and as all the articles of culture were equal, it can be owing to nothing but the autumnal ploughing: it proves that for this crop, farmers should be very attentive to break up their stubbles before winter; for the superiority of two bushels amounts to at least half the rent of the land. In addition to this, I may remark, that this result perfectly agrees with that of N<sup>o</sup> 3. Beans being well hand hoed, seed weeds growing much in the spring, are not of consequence, for they rob the crop but a short time, not doing any damage equal to the benefit the plants receive from the effect of the soil being exposed to the frosts, &c. Beans also are generally sown so early, that they admit of very little spring tillage, from whence results the necessity of giving them the advantage of an autumnal ploughing,

#### EXPERIMENT, N<sup>o</sup> 5.

Ploughed up the principal part of field W, in October and November 1765; but left one land in the middle of it until the first week in March. The 19th of November a pretty severe frost came, which lasted till the 24th, when a thaw ensued for two days, and it froze again till the 6th of December. From the 23d till the 30th, was a sharp frost. On the 1st of February it set in again; and on the 2d and 3d, froze as severely as ever I knew: I minuted these circumstances to observe the effect on preceding ploughings, and also the crop: stirred the whole the 23d of April, the land left till the spring was not in such good tilth as the rest; but the field being drilled with oats; I could perceive no difference in the appearance of the crop from coming up to harvest; but the corn was not measured separately. Upon which I should observe, that there might be a difference of product, without its being in that manner visible; only such difference could be but trifling, or it would have shewed itself in the growth of the oats.

EXPERIMENT, N<sup>o</sup> 6.

In field T, ploughed up a land of ten perches of barley stubble, in October 1765, and another adjoining the first week in March; the second week of that Month, stirred them both again and sowed them with beans, which were twice hand hoed; produce of the autumn ploughed one bushel, three pecks; of the spring ploughed one bushel, two pecks and a quarter; superiority, three bushels *per* acre. The benefit of the ploughing before winter is here sufficiently apparent; for the year being a good bean one, shewed in the largeness of the product the consequence of the variation, much more than if the season had been unfavourable. Three bushels superiority are so considerable, that the benefit of giving the first tillage at that time, must be immense; whether the reason is, that the soil acquires virtue from the atmosphere, or is only pulverized by the frosts, I know not; but am inclined to think the latter; or perhaps both, in some degree: but the expence being the same, not a single ploughing more in one way than the other, there evidently is no motive to desist from the practice, unless the stubble yielding sheep feed is one; and how well that balances three bushels *per* acre of beans, let any one judge.

EXPERIMENT, N<sup>o</sup> 7.

In October 1766, ploughed up ten perches of oat stubble in field L\*; and ten more adjoining the first week in March; the 28th, ploughed them both again, and sowed them with beans: they were hand hoed twice; product of the first, a bushel and a peck; of the second, a bushel and half a peck; superiority *per* acre, two bushels. Which difference is so great, that I must own myself convinced of a point that once was dubious with me. As this trial was perfectly equal to both, in all other circumstances: the superiority of one part, could be owing to nothing but the variations in season of breaking the stubble. N. B. In the winter were several very sharp frosts and deep snows.

EXPERIMENT, N<sup>o</sup> 8.

In October 1766, ploughed up ten perches of wheat stubble; and ten more adjoining the latter end of February: stirred them both in March, and again in April; on which earth harrowed in barley; produce of the autumnal ploughed one bushel; of the spring ploughing, about a pint less. A superiority so small, that one can scarcely venture to found any conclusions on it.

## GENERAL OBSERVATIONS.

These experiments are, in certain circumstances, extremely clear and decisive; but not equally so in others. Ploughing up the stubbles in autumn, that are designed for beans, is absolutely necessary: this fact is proved too clearly to admit a doubt. In a fallow for turnips, &c, &c. there also appears to be a great advantage in the practice, in pulverizing the land against the growing season of weeds, more than there is time for, if left till the spring unploughed: a point which I apprehend, is of great importance, tho' never attended to by common farmers.

On the contrary, it doth not appear that the autumnal ploughing is a matter of consequence to spring corn. This is the result of the preceding trials: I apprehend it to be owing to the weeds, as in the other case, growing more on that account, and as neither following ploughings, or hand hoeings, destroy them, they are raised to damage the barley or oats; the fact appears to be clear; whether this method of accounting for it is just, is another enquiry. But I do not think it a material point; and for this reason; it is arguing on *bad* husbandry alone. Barley or oats never ought to be sown on a white corn stubble whenever ploughed up, but always either on a fallow, or after a fallow crop; so that this dubiousness is not of consequence.

The great advantages of the practice lies therefore unimpeached; and they should certainly be an inducement to the farmers to practise this husbandry much more than they at present do; and give up the shallow argument of finding a little paltry sheep feed. But let me here warn the reader from extending these conclusions to all sorts of soils: I think it is very possible, that some may be found whereon the practice would not always be advisable. Suppose a soil to be of such a nature, that a stubble on it breaks up the first dry weather in spring in absolute moulds, in as good tilth as another part that was ploughed before winter; suppose also that its being opened to the winter's rains is a disadvantage to it, under the principle of its requiring to be left in the rounded compact form left by the last crop, to shoot off all water before it penetrates; that such a soil exists, I very much suspect, and it appears clear to me, that on such, the autumnal ploughing would by no means be advisable.

## S E C T. II.

## Of the NUMBER of PLOUGHINGS.

**T**HIS is a part of the farmer's business in which common husbandmen vary much in their opinions on the same soil. Some of them like and practice many earths in a year of fallow; others but few: some fix on three as a sufficient number; others on four; others on five, &c. &c. Before I insert the few trials I have made on this point, I must observe to the reader, that it scarcely admits of strongly marked distinctions. Suppose that on an average of twenty years, five ploughings on a given soil were found to exceed all other numbers; there can be no doubt but four, or six, or seven, would in certain seasons prove more beneficial. The propriety of much or little tillage must depend most intimately on the season; on the weather previous to each ploughing; and on that which follows each, which is quite a matter of chance; so that I must beg the reader to expect no striking conclusions in a matter which appears to me to admit of none; nor have my experiments been continued years enough to reduce uncertainties in a few seasons to certainties in many. However, my chief attention has been given to a few points, in which the common variations are very great; consequently some distinctions worthy of notice may be found.

EXPERIMENT, N<sup>o</sup> 1.

In October 1764. marked three fatches, or beds, each ten perches, in field T. for a trial of the number of ploughings. Designed them for turnips, which were sown in June on

Four ploughings in N<sup>o</sup> 1.

~~Five~~ in N<sup>o</sup> 2.

Six in N<sup>o</sup> 3.

The tillage of each given only in dry good seasons, at the times most proper for the respective earths. The extra tillage of N<sup>o</sup> 2, 3, given in May and June. The fly destroyed the crops, so the lands laid for wheat; but the number of ploughings made up six, seven, and eight, sown in October; the crops in 1766 were,

- N<sup>o</sup> 1. Three pecks.  
 2. Three pecks and 1 quart.  
 3. Three pecks and 1 pint.

The superiority of a quart is two pecks an acre. N<sup>o</sup> 3. being inferior to N<sup>o</sup> 2, while N<sup>o</sup> 2. is better than N<sup>o</sup> 1. gives one some reason to think that the extra tillage had not *great* effects: but both N<sup>o</sup> 2. and 3, being superior to N<sup>o</sup> 1. carries a different appearance, and weighs I think rather the most.

#### EXPERIMENT, N<sup>o</sup> 2.

The beginning of March 1765, ploughed up a bed of turnip land in field M\*, containing ten perches. The latter end of the same month ploughed up another adjoining, and at the same time stirred the first again. The first week in April ploughed up a third; and at the same time stirred both the former again; harrowed in barley, 4 bushels *per* acre on these earths, on all three; produce of the crops,

- N<sup>o</sup> 1. Three earths; 6 pecks, or *per* acre 3 qrs.  
 2. Two earths; 5 pecks, or *per* acre 2 qrs. 4 bushel.  
 3. One earth; 4 pecks and 1 pint; 2 qrs. and 1 peck *per* acre.

The consequence of spring tillage for barley cannot be clearer than in this experiment: the addition of one earth; which costs three or four shillings, yields a return of four bushels of barley, worth more than three times as much. Indeed the extreme dry season must have operated very strongly in this effect, for the land that was imperfectly tilled must admit the sun in a more burning manner, and at the same time imbibe much less of the dews than land in fine order; which reasoning I apprehend is just; but whether it is or not, the facts remain the same, and prove the point sufficiently.

#### EXPERIMENT, N<sup>o</sup> 3.

In October 1765, marked four beds in field R. each ten perches, and ploughed them as follows:

N<sup>o</sup> 1. First earth in October; second in March; third in May; fourth in June.

N<sup>o</sup> 2. First earth in October; second in March; third and fourth in April; fifth in May; sixth in June.

N<sup>o</sup> 3. First earth in October; second in March; third and fourth in April; fifth and sixth in May; Seventh and eighth in June.

N<sup>o</sup> 4. First earth in October; second in November; third and fourth in March; fifth and sixth in April; seventh and eighth in May; ninth and tenth in June.

The last earth the same day to all; and harrowed in turnips at the same time: the crops were hand hoed twice in the common manner. In December weighed them, and found their products; proportioned *per* acre to be as follows;

N <sup>o</sup>					Ton. cwt. qrs. lb.			
					17	10	2	1.
2.	-	-	-	-	21	11	3	27
3.	-	-	-	-	19	19	2	7
4.	-	-	-	-	23	14	1	22

The general result of the trial is very satisfactory in favour of much tillage but the contradiction of N<sup>o</sup> 3. being less than N<sup>o</sup> 2. cannot be accounted for: It must be referred to the chapter of accidents. The superiority of N<sup>o</sup> 2, 3, and 4; is, upon the whole, great enough to shew that the plant affects so much tillage; much more than the proportion of N<sup>o</sup> 1.

But there is another light in which this trial must be viewed, which is the comparison of the product with the expences: now it is remarkable that in this respect the lowest product is preferable to the highest; so that it should be remembered by the cultivator of turnips, that he may make his land so fine that his crop shall be too good to be profitable.

The difference between four and six earths is however in favour of the latter, respecting the balance of clear profit. Which shews that an increase of tillage, in many cases, occasions a proportionable increase of profit.

#### EXPERIMENT, N<sup>o</sup> 4.

Marked in October 1765, five beds in field T. each containing ten perches, and gave them the following tillage.

N<sup>o</sup> 1. First earth in October; second in March; third in April; fourth and fifth in May; sixth in June.

N<sup>o</sup> 2. First earth in October; second in March; third and fourth in April; fifth in May; sixth and seventh in June.

N<sup>o</sup> 3. First earth in October; second in November; third in March; fourth in April; fifth and sixth in May; seventh and eighth in June.

N<sup>o</sup> 4. First earth in October; second in November; third and fourth in March; fifth in April; sixth and seventh in May; eighth and ninth in June.

N<sup>o</sup> 5. First earth in October; second and third in November; fourth and fifth in March; sixth, seventh, and eighth in April; ninth and tenth in May; eleventh and twelfth in June.

Harrowed in turnips at the same time on the last earth: hand hoed them twice in the common manner. Produce as follows *per* acre.

						Ton. cwt. qrs. lb.			
N <sup>o</sup>	1.	-	-	-	-	16	0	3	13
	2.	-	-	-	-	16	0	2	27
	3.	-	-	-	-	17	0	0	0
	4.	-	-	-	-	20	3	2	22
	5.	-	-	-	-	25	2	1	11

This result upon the whole is very satisfactory, and proves, I think, in a clear manner, of how much consequence good tillage is of to the culture of turnips. In most of these variations the increase of product is more than sufficient to pay the increasing expence of tillage: from whence we may fairly conclude the necessity of many ploughings for the production of turnips.

#### EXPERIMENT, N<sup>o</sup> 5.

In October 1766, marked three lands in field L\*, each of ten perches, and gave them the following ploughings.

N<sup>o</sup> 1. First earth in October; second the beginning of March; third the latter end of the same month; fourth the first week in April.

N<sup>o</sup> 2. First ploughing in October; second in November; third and fourth in March; fifth the first week in April.

N<sup>o</sup> 3. First and second ploughings in October; third in November; fourth and fifth in March; sixth the first week in April.

Harrowed in barley (four bushels an acre) on each, upon the last earth, produce as follows:

- N<sup>o</sup> 1. Three pecks, or *per* acre, 1 qr. 4 bushels.
- 2. One bushel, or *per* acre 2 qrs.
- 3. One bushel, or *per* acre 2 qrs.

Upon this trial it is observed that the tillage superior to N<sup>o</sup> 1. is attended with great increase of product, much more than sufficient to pay the  
expence

expence of it; but the increase from N<sup>o</sup> 2. to N<sup>o</sup> 3. is not attended by any proportioned produce; this teaches us to be moderate even in good things: indeed the number of earths in the last division is so great for the time, that one cannot well conceive the use of them. Ploughings that do not manifestly pulverize to a great degree, and expose fresh land to the atmosphere, visibly by a change of colour, cannot answer the expence.

#### GENERAL OBSERVATIONS.

We gather from these experiments, upon the whole, that many ploughings are an object of importance for several crops. It does not appear that three are better than four in such a degree, or that four are better than six: but that many are superior to few, being attended with such an increase of product as to more than pay the extraordinary expences, and this particularly with turnips and barley. From whence the farmer should take care that he has teams sufficient to give his arable lands numerous earths, and never be under the necessity of sowing land that is not sufficiently pulverized. The advantages apparent in the first crop, are not perhaps the only ones in favour of much tillage; in all probability the succeeding ones are benefitted by it: in all such points, the profit of good husbandry consists in the general effect of the land always being fine and in good heart; always in tillage good enough to take advantage of every season that offers. Such advantages are beyond calculation.



## S E C T. III.

## Of the DEPTH of PLOUGHING.

**I**N this part of husbandry our common farmer's, I should apprehend, must be very deficient in their practice: they stir the same depth on all soils and for all crops; nor will they believe that any crop requires a greater depth than they commonly stir. Whether this is the fact, I am not enquiring at present; but that many of them are mistaken must be, as numbers of them offer those opinions but for various depths, each for his own, some therefore must be wrong. The following trials were not undertaken so much with design to settle such variations as to bring the assertions of numerous writers on this subject to the test of experiment. I could not but admire in many of them a force of reasoning that convinced me; and under the design of acting accordingly, I began with trials in small, before I cultivated my whole farm according to their directions.

EXPERIMENT, N<sup>o</sup> I.

In October, 1764, marked two fatches (beds) in field L<sup>a</sup>, each containing ten perches, ploughed one of them with four horses to the depth of about ten inches; and the other in the common manner, about five inches deep; water furrowed both equally. The beginning of April, manured them at the rate of twenty loads an acre of rotten farm yard dung; turned it in the same month. Gave them three ploughings more of common and equal depths, and harrowed in turnip seed the middle of June. I was lucky enough to have them escape the misfortunes of the season: both crops were well and equally hand hoed, and being weighed in January following, the trench-ploughed bed weighed 2 tons, 5 cwt. 3 qrs. those of the common ploughed, 2 tons, 2 cwt. 2 qrs.

Trench-ploughed,	-	-	-	-	-	-	2	5	3
Common ditto,	-	-	-	-	-	-	2	2	2
Superiority ; which is <i>per</i> acre 2 tons, 12 cwt.	-	-	-	-	-	-	0	3	1

This is but a small difference ; yet I think it is too much to be slighted. It is more than sufficient, I apprehend, to pay the extra expence of the trench-ploughing ; so that the greater depth of staple for future crops is gained for nothing. This must be considered as an advantage ; for if the depth gave such a superiority to this crop, surely it will give some, at least, to the ensuing ones ?

### EXPERIMENT, N<sup>o</sup> 2.

At the same time as the preceding experiment, tried the same in field M\*, on the gravelly loam, in all particulars similar to N<sup>o</sup> 1. The product as follows :

									Ton. cwt. qrs.
Of the trench-ploughed,	-	-	-	-	-	-	2	2	0
Of the common ditto,	-	-	-	-	-	-	1	15	1
Superiority ; which is <i>per</i> acre 5 tons, 8 cwt.	-	-	-	-	-	-	0	6	3

This superiority is very considerable : more, I apprehend than there was reason to expect would have attended the variation of culture : the greater effect appearing on this soil than on the clayey loam, may perhaps be owing to the roots of the turnips finding more difficulty in penetrating in it ; and if they strike downwards in search of nourishment, as the tap-roots prove they do, in such case, that soil must certainly pay best for trenching which resists them most.

### EXPERIMENT, N<sup>o</sup> 3.

The beginning of October, 1765, marked three fatches in field L\*, each ten perches, and ploughed them as follows :

- 1. N<sup>o</sup> 1, in the common manner, about five inches deep.
- 2, with four horses, about ten inches deep.
- 3, with four horses, about twelve inches deep.

and left them well water furrowed for the winter. The first week in March, stirred them all three ; and again the middle of April ; upon which earth, harrowed in barley. Produce,

N <sup>o</sup> 1,	-	-	3 $\frac{1}{2}$ pecks	-	-	1qr. 7 bushels <i>per</i> acre.
2,	-	-	3 $\frac{1}{2}$ ditto	-	-	1qr. 6 bush. <i>per</i> acre.
3,	-	-	3 $\frac{1}{2}$ ditto	-	-	1qr. 5 bush. <i>per</i> acre.

This result much surprized me. I fully expected that as the deep tillage was given before winter, the frosts, &c. would so far ameliorate and sweeten the new earth brought up, that the crop would be the better for it : instead of which, it is bad in proportion to the quantity. From hence I conclude, that the winter alone is not sufficient to sweeten it ; but that a summer also is necessary for such purpose.

When the land is autumn trenched for turnips it has both winter and summer on it. I do not, however, compare turnips and barley, as equally benefited by such deep ploughing ; for I should not conceive it possible : the barley roots can never run so deep as the turnip ones, nor have an equal strength.

#### EXPERIMENT, N<sup>o</sup> 4.

The beginning of October, 1765, marked in field T. three lands, each containing ten perches, and ploughed them as follows.

- N<sup>o</sup> 1, in the common manner, about five inches deep.
- 2, with four horses, about ten inches deep.
- 3, with four horses, about twelve inches deep.

Throughout the following spring and summer gave them in the common manner, at the same time, five earths, and sowed wheat in the proportion of two bushels of seed *per* acre, and reaped in 1767, exactly 3 $\frac{1}{2}$  pecks from each. There being no difference in the products, much surprized me ; for it seems to prove, that for wheat if you take off the sownness of the under stratum of earth by winter and summer ploughing, so as it does no mischief, you then reduce it to a state in which it does neither good nor harm. It is evident either that the roots of the wheat did not penetrate the deeper, for the deep ploughing ; or that they found nothing worth going for.

#### EXPERIMENT, N<sup>o</sup> 5.

At the same time as the preceding trial, executed the exact counterpart of it in field M\*. The products as follow :

N <sup>o</sup> 1,	-	-	3 $\frac{1}{2}$ pecks.
2,	-	-	ditto.
3,	-	-	3 $\frac{1}{2}$ pecks.

Here we find, that ploughing ten inches does no good, and that stirring twelve is mischievous ; the produce less by a bushel an acre. I cannot but

### EXPERIMENT, N° 6.

N<sup>o</sup> 1, five inches deep.  
2, ten inches deep.  
3, twelve inches deep.

										Ton. cwt. qrs. lb.			
N <sup>o</sup> 1,	-	-	-	-	-	-	-	-	-	1	17	2	20
2,	-	-	-	-	-	-	-	-	-	2	3	1	11
3,	-	-	-	-	-	-	-	-	-	2	2	2	21

### EXPERIMENT, N<sup>o</sup> 7.

N<sup>o</sup> 1. One bushel.  
2. One bushel wanting half a pint.  
3. Ditto.

### EXPERIMENT, N<sup>o</sup> 8.

No 1.

N<sup>o</sup> 1, in the common manner, about five inches deep.

N<sup>o</sup> 2, with four horses, ten inches deep.

N<sup>o</sup> 3, with ditto, twelve inches.

N<sup>o</sup> 4, with two ploughs; one with two horses, five inches deep; and then another in the same furrow with four horses, eight inches more. Thirteen deep in all.

N<sup>o</sup> 5, with two ploughs, each with four horses, twice in the same furrow. Fourteen inches deep in all.

Water furrowed them well and equally. In March following stirred them in the common manner; gave another earth in April, and another in May; manured on this ploughing, at the rate of twenty loads *per* acre; stirred again in June, and planted them with Battersea cabbages, one row on a five feet ridge, two feet asunder, the plants perfectly equal. They were equally horse and hand hoed. Product in November following as follows:

										Ton.	cwt.	qrs.	lb.
N <sup>o</sup> 1,	-	-	-	-	-	-	-	-	-	1	10	1	2
2,	-	-	-	-	-	-	-	-	-	2	0	0	17
3,	-	-	-	-	-	-	-	-	-	2	1	2	11
4,	-	-	-	-	-	-	-	-	-	1	17	3	27
5,	-	-	-	-	-	-	-	-	-	1	17	2	14

This result is strongly in favour of ploughing as deep as ten or twelve inches; but much against cutting deeper; which I think is accountable for, in supposing that too much of the lower earth should not be brought up *at once*; for these plants that like deep ploughing, I apprehend it would be more advisable to gain the desired depth by degrees; supposing cabbages to require a greater depth, I mean than twelve inches. The superiority of N<sup>o</sup> 2, and 3, to N<sup>o</sup> 1, shews plainly how necessary deep ploughing is for this crop: it is attended by so much greater product, that no person, anxious for great products of it, would, I think, neglect the precaution.

#### GENERAL OBSERVATIONS.

From these experiments we gather several facts that deserve attention: they are simple, and drawn up in very few words. For corn, the common depth of five inches is preferable to deeper ploughing; but for turnips and cabbages, ten or twelve inches exceed it much, which depth is also preferable to a greater. These circumstances, which are clearly deducible from the preceding trials, may serve to give us some idea of the proper conduct in the article of tillage.

Let turnips or cabbages (as they certainly ought) be the first crop in the course; and plough for them in October, about ten or twelve inches deep; those

those crops, it is certain, will be the better for this, and to a degree much more than sufficient to pay the extra expence. It is true, the following corn will reap no benefit ; but then it will receive no mischief ; and as the expence is repaid with profit, that matters not.

But something should be considered further than the line drawn by these experiments : had I continued them some years longer, I should have been able to speak more decisively : but we may be allowed to reason a little at present. In all probability the soil brought up by the deep ploughing is not sweetened enough, and ameliorated by two years culture to be of service to corn, although it is of great utility to turnips and cabbages : but this does not prove that in five, six, or seven years, the case should remain the same. I am clearly of opinion that it would not : but that, on the contrary, the whole mass of earth, as deep as ploughed, would become of one nature, and be all so ameliorated that the roots would draw nourishment equally from all parts of it. I mention nothing of their striking deep enough for it ; because I know from various small experiments, that the roots of all sorts of corn will strike deeper than twelve inches in fine rich mould ; consequently the crops of the preceding trials received no benefit, not for want of going deep enough, but for want of receiving nourishment from the new earth. Repeated ploughings, &c. had mixed the old and new, it is true ; but they were not so intimately blended, and become of one nature, for the roots to receive equal food from every particle they passed. I apprehend the new earths were passed by them the same as stones ; throwing out fibres to seed upon the old mould ; but neglecting the new.

Now a longer series of tillage would change this case, in bringing all the soil to one state. This cannot be doubted ; especially if the deep ploughing be repeated for every crop that requires it ; which would be once at least in every course ; and when the mould, to the depth ploughed was all alike, there can be no doubt of the roots gaining nourishment from all of it ; and consequently the crops being better. Hence we may suppose the practice of deep ploughing of sure benefit, tho' not apparently in all crops, for two or three year. And upon this principle, which I think is pretty consistent with the preceding trials, I shall not hesitate to trench-plough in future.

## C H A P. II.

## Of the EXPENCE of TILLAGE.

THIS is a part of the business of an experimental farmer, that I think has been strangely neglected by all the authors with whom I am acquainted. They have either omitted every thing of this sort, or charged in their accounts the prices of the country, which appear to me to be no prices at all. Ploughing in this neighbourhood, for the farmer to find plough, horses, man, &c. is 4s. an acre: if I let my ploughs, I should be paid for them at that rate; if I hire, I pay at that rate: sure then, say some, *that* is the proper direction to charge the expence in an experiment. But I think I have reason absolutely to say *no*: If you hire, you pay 4s. if you let, you receive 4s. but it is not one season in ten that you can do either one or the other when it suits you: you will let at your leisure, but others then won't hire; they will let at their leisure, but *you* then won't hire. So that this standard price merely concerns the leisure times of the year; that is, much the least important: how such a valuation can be esteemed tolerably accurate is surprizing. If I could do the whole business of my farm with hired teams, the idea would be an extreme just one; but as that is an utter impossibility, to fix on what is called the price of the country is fixing merely on an imaginary sign: *x*, *y*, *z*, always conveying the same idea, would be equally useful and accurate. For these, and other reasons I mentioned in another place, I was induced to keep so exact an account of my expences, as to be able from them to charge my tillage at the *real* price.

EXPERIMENT, N<sup>o</sup> 1.

Expences of ploughing, 1765.		£.	s.	d.
General expences of the horses <i>per</i> acre for this year, see }	Book xiii. Chap. iv.	0	2	0
Wear of the plough, * see book xiv.		0	0	4½
Carried over,		0	2	4½

\* Of Wood.

Brought

	£.	s.	d.
Brought over,	0	2	4½
Wear of the harness,	0	0	0½
The ploughman,*	0	1	0
	0	3	4½

EXPERIMENT N<sup>o</sup> 2.

Expence *per* acre with horses, and the wooden plough, 1766.

	£.	s.	d.
General expences of horses,	0	2	1
Wear of the plough,	0	0	5
Ditto of the harness,	0	0	0½
Ploughman,	0	1	0
	0	3	6½

EXPERIMENT, N<sup>o</sup> 3.

Expence *per* acre with horses and the iron plough, 1766.

	£.	s.	d.
General expences of the horses,	0	2	1
Wear of the plough,	0	0	2
Ditto of the harness,	0	0	0½
Ploughman,	0	1	0
	0	3	3½

EXPERIMENT, N<sup>o</sup> 4.

Expence *per* acre with oxen and the wooden plough, 1766.

	£.	s.	d.
General expences of the oxen,	0	1	9
Wear of the plough,	0	0	5
Ploughman,	0	1	0
Driver,	0	0	3
	0	3	5

\* For a part of the year he earns something besides; but then it is a trifle: for when the irons want repairing, he carries them to the blacksmith's, and takes great pains to do as little as possible besides his acre (which, by the bye, he does not always perform) from a notion among them, that an acre is a *day's* work; and accordingly it is common with some farmers to put their ploughing to them by the piece; when the price is always 1s. an acre.

EXPERI-



EXPERIMENT, N<sup>o</sup> 5.Expence *per* acre with oxen, and the iron plough, 1766.

	£.	s.	d.
General expences of the oxen, - - - - -	0	1	9
Wear of the plough, - - - - -	0	0	2
Ploughman, - - - - -	0	1	0
Driver, - - - - -	0	0	3
	<hr/>		
	0	2	2

In the year 1766, I had three wooden ploughs with horses, and one of iron with oxen ; consequently the mean price *per* acre that year (supposing they worked alike) was 3s. 5½*d.*

In the years 1763 and 1764, I did not keep an account exact enough to draw up these particulars ; but as the general expence of horses in 1765 was 14*l.* 6*s.* 6*d.* *per* horse, and ploughing, 3*s.* 4½*d.* and as the general expences of 1763 were 10*l.* 13*s.* the price *per* acre proportionably will be 2*s.* 6*d.* for the year 1763 ; and the year 1764 being determined by the same rule (the general expences *per* horse being 8*l.* 10*s.* 11*d.*) the price *per* acre will be 2*s.*

EXPERIMENT N<sup>o</sup> 6.Expence *per* acre of harrowing, 1765 and 1766.

	£.	s.	d.
General expences of the horses 3 <i>s.</i> 6 <i>d.</i> <i>per diem</i> , 10 acres, -	0	0	4½
Harnes, - - - - -	0	0	0½
Labour,* - - - - -	0	0	1
	<hr/>		
	0	0	5½

1766 the same ; as the fraction of the 1½*d.* in general expences will not amount to ¼*d.*

The same proportions being used as with the ploughing the expence *per* acre of the years 1763 and 1764 will be,

1763, *per* acre 4*d.*  
 1764, - - - 3½

\* The journey is the same in time as the plough ; but as a boy sometimes is used, I call it a penny a day. But there is nothing saved by a boy ; a man walks off with the horses much faster.

EXPERI-

EXPERIMENT N<sup>o</sup> 7.Expence *per* acre rolling, 1765 and 1766.

	£.	s.	d.
General expences of horses, 10 <i>d.</i> <i>per diem</i> , 16 acres,	0	0	0½
Labour,*	0	0	0½
	0	0	1

The variations of different years are too small to alter this sum to the amount of a farthing.

EXPERIMENT, N<sup>o</sup> 8.

Expence of drilling.

The expences of this operation include only the horse proportioned to ploughing; the following table shews the whole in one view.

	1764.	1765, 6, 7.
Once in three feet,	2½ <i>d.</i>	5 <i>d.</i>
— four feet,	2	3½
— five feet,	1½	3
— six feet,	1½	2½

EXPERIMENT, N<sup>o</sup> 9.

Expence of horse hoeing.

Horse hoeing I calculate by proportioning it to ploughing, as the circumstances are the same.

	1764.	1765.	1766.
	s. d.	s. d.	s. d.
One bout in two feet,	1 0	2 4½	2 5½
— three feet,	0 8	1 7½	1 7½
— four feet,	0 6	1 2½	1 2½
— five feet,	0 5	1 0	1 0
— six feet,	0 4	0 9½	0 9½
— seven feet,	0 3	0 7	0 7½

\* The harnesses are cart ones; and in their account it was impossible to separate the rolling share, which however is a trifle, not susceptible of division *per* acre.

Although, in the common acceptation of the word *tillage*, nothing more is meant than ploughing, harrowing, and rolling, yet the design of the present book makes it requisite to include all the operations of the team, relative to the soil, such as carting of manure on to it, and carrying the crop from off it; these articles must therefore be added here.

EXPERIMENT, N<sup>o</sup> 10.

Expences of carting manure in 1765 and 1766.

	£.	s.	d.
General expences of horses, 1105 loads, 15 <i>l.</i> 10 <i>s.</i> that is <i>per</i> load	0	0	3 $\frac{1}{2}$
Repairs of the carts 8 <i>d.</i> <i>per diem</i> , or <i>per</i> 18 load, which <i>per</i> load	-	-	-
is near	-	-	-
Ditto of the harness 2 $\frac{1}{2}$ <i>d.</i> <i>per diem</i> , or <i>per</i> load,	0	0	0 $\frac{1}{2}$
	*	0	0
			3 $\frac{1}{2}$

The variation in the first article in the year 1766 is too small to cause an alteration; but as it would lessen it, the fraction of a farthing, the one-eighth is left out in the preceding experiments, where these calculations are made use of.

According to the preceding proportions, this in 1763 was - 2 $\frac{1}{2}$ *d.*  
 1764 - - 2 $\frac{1}{2}$

EXPERIMENT, N<sup>o</sup> 11.

Expence of carting in harvest, 1765, and 1766.

	£.	s.	d.
General expences of horses 2 <i>s.</i> 6 <i>d.</i> <i>per</i> journey; 2 carriages will } upon a medium of wheat and spring corn, clear at an average, about 6 acres a day, this is therefore <i>per</i> acre }	0	0	5
Repairs of the carriages; a waggon and a cart † 9 $\frac{1}{2}$ <i>d.</i> <i>per</i> jour- } ney, or <i>per</i> acre, - - - - - }	0	0	1 $\frac{1}{2}$
Ditto of the harness, 1 <i>d.</i> <i>per</i> journey, - - - - -	0	0	0
	+	0	0
			6 $\frac{1}{2}$

According to the preceding proportions, this in the year 1763 was - 4 $\frac{1}{2}$ *d.*  
 1764 - 3 $\frac{1}{2}$

\* The labour is not added, as it is so various; but through the preceding experiments it is thrown by itself.

† The waggon, - - 7*d.*  
 Two carts 4 $\frac{1}{2}$ *d.* one - 2 $\frac{1}{2}$

9 $\frac{1}{2}$ 

‡ Labour not added, upon account of the numerous variations.

Upon these calculations of expence, let me in general remark, that I do not offer them as universally exact, even in this country ; not from errors, but for want of a longer course of business. In twenty years, for instance a man's teams, implements, and harness probably wear up almost twice over, and consequently if such a register as this was kept for such a period, it would include not only what did happen ; but, in all probability, what *would happen in any other twenty years*, which is a point of great consequence ; for having good or ill luck with the horses of a team makes a vast difference in the expences of tillage. But I think this want of general authenticity is no objection to pursuing the preceding method, because it would be an argument for remaining for ever in the dark. Let every experimenter keep the same account, and the matter would soon be reduced to a certainty : in any place where the prices of hay, oats, straw, &c. &c. were given, we should be able to give that of tillage upon an average of accidents to the cattle. But if such perfection is never gained, still I must repeat, that the *real* expence is the only one that ought to be charged ; there being objections to it, is of little consequence, unless those objections are greater than to mere random charges.

END of the EIGHTH BOOK.



EXPERIMENTAL  
AGRICULTURE.  
BOOK IX.  
OF GRASS LANDS.



## B O O K IX.

## O F G R A S S L A N D S.

**T**HIS part of husbandry is undoubtedly of great importance; and yet it has been almost totally neglected by most of the gentlemen who have published on husbandry: experimental agriculture has been confined to arable crops; one would imagine that the simplicity of grass land gave them an idea that its conduct could not rise to the accuracy of experiment, or that it admitted too few variations, but neither of these are the case; nor can I see why we should neglect to gain a certain knowledge of the circumstances attending meadows and pastures, as we are desirous of acquiring of arable lands. General husbandry can be but little understood, if the value of the one be not accurately decided as well as the other. My principal object in these experiments was to gain a clear knowledge of the product of my grass fields; for which end I kept an exact register of the feeding of all my cattle: this single circumstance gave me an opportunity of drawing out many of the following experiments, which will give a much better idea of the value of grass, than many volumes of general reasoning and remarks.



## C H A P. I.

## EXPENCES and PRODUCE.

I Shall here insert the register of the grafs fields throughout the period I farmed them, making no divisions of years; but draw up the principal circumstances into tables at last, and strike the averages.

EXPERIMENT, N<sup>o</sup> 1.

Expences and produce of two acres, field C. 1763.

Rolled in October 1762, and again in March 1763. Fed by various cattle.

EXPENCES.						£.	s.	d.
Rolling,	-	-	-	-	-	0	0	2
Rent, &c.	-	-	-	-	-	2	0	0
						2	0	2

PRODUCE.						£.	s.	d.
Keeping six horses five weeks, at 1s. 6d.	-	-	-	-	-	2	5	0
— twenty sheep eight weeks, at 2½d.	-	-	-	-	-	1	13	4
— four cows four weeks, at 1s. 6d.	-	-	-	-	-	1	4	0
						5	2	4
Expences	-	-	-	-	-	2	0	2
Profit 1l. 11s. 1d. per acre,	-	-	-	-	-	3	2	2

OBSERVATIONS.

## OBSERVATIONS.

It is to be remarked that this piece of land, being a lawn before the house, was never mown, and naturally as well as artificially extremely rich, which explains the large quantity of cattle it maintained. The profit is very considerable.

EXPERIMENT, N<sup>o</sup> 2.

Expences and produce of three acres three roods, field B. 1763.

Rolled in October and March. Mown the 20th of July. Produce 7 ton, 5 cwt. or *per* acre, 1 ton, 16 cwt.

## EXPENCES.

	£.	s.	d.
Rolling, - - - - -	0	0	8
Mowing, - - - - -	0	5	7
Making, weighing, &c. - - - - -	0	19	0
	<hr/>		
	1	5	3
Rent, &c. - - - - -	3	15	0
	<hr/>		
	5	0	3

## PRODUCE.

	£.	s.	d.
Seven ton, 5 cwt. of hay, at 30s - - - - -	10	17	6
Keeping 4 cows 3 weeks, 1s. 6d. - - - - -	0	18	0
	<hr/>		
	11	15	6
Expences - - - - -	5	0	3
	<hr/>		
Profit, - - - - -	6	15	3
Carting, - - - - -	0	2	3
	<hr/>		
Clear profit, 1l. 15s. 4d. <i>per</i> acre, - - - - -	6	13	0

## OBSERVATIONS.

This was not only a great crop of hay, but the price was high. The profit of five and thirty shillings an acre upon a crop, with so few of the unspecified expences, is certainly very great, on comparison with arable crops.

EXPERIMENT, N<sup>o</sup> 3.

Expences and produce of five acres, three roods, field A. 1763.

Rolled in October and March. Mown the 22d of July, &c. Produce 9 ton, 11 cwt. which is *per* acre, 1 ton, 12 cwt.

EXPENCES.							£.	s.	d.
Rolling,	-	-	-	-	-	-	0	1	0
Mowing,	-	-	-	-	-	-	0	8	7
Making, weighing, &c.	-	-	-	-	-	-	1	7	0
							<hr/>		
							1	16	7
Rent, &c.	-	-	-	-	-	-	5	15	0
							<hr/>		
							7	11	7
							<hr/>		

PRODUCE.							£.	s.	d.
9 ton, 11 cwt. at 30s.	-	-	-	-	-	-	14	6	6
Keeping 32 sheep 4 weeks	-	-	-	-	-	-	1	6	8
							<hr/>		
							15	13	2
Expences,	-	-	-	-	-	-	7	11	7
							<hr/>		
Profit,	-	-	-	-	-	-	8	1	7
Carting,	-	-	-	-	-	-	0	3	5½
							<hr/>		
							7	18	1½
							<hr/>		

## OBSERVATIONS.

The same circumstances which operated so favourably for N<sup>o</sup> 2. had equal effect here. The crop was large, the price high, and the profit consequently great.

EXPERIMENT, N<sup>o</sup> 4.

Expences and produce of six acres, field D. 1763.

Rolled in October and March; and designing to feed it, four cows were turned into it for three weeks, but finding I should have feed enough without it, they were taken out, and it was mown the 20th of August. Produce 8 ton, 1 cwt. which is *per* acre, 1 ton, 7 cwt.

EXPENCES.

EXPENCES.						£.	s.	d.
Rolling,	-	-	-	-	-	0	1	0
Mowing,	-	-	-	-	-	0	9	0
Making, &c.	-	-	-	-	-	1	4	9
						<hr/>		
Rent, &c.	-	-	-	-	-	1	14	9
						6	0	0
						<hr/>		
						7	14	9
						<hr/>		
PRODUCE.						£.	s.	d.
Keeping 4 cows 3 weeks,	-	-	-	-	-	0	18	0
8 ton, 1 cwt. of hay at 30s.	-	-	-	-	-	12	1	6
Keeping 4 cows 4 weeks,	-	-	-	-	-	1	4	0
20 sheep 2 ditto,	-	-	-	-	-	0	8	4
2 horses 3 ditto,	-	-	-	-	-	0	9	0
						<hr/>		
						15	0	10
Expences,	-	-	-	-	-	7	14	9
						<hr/>		
Profit,						7	6	1
Carting,	-	-	-	-	-	0	3	6½
Rolling,	-	-	-	-	-	0	0	6
						<hr/>		
						0	4	0½
						<hr/>		
						7	2	0½
						<hr/>		

## OBSERVATIONS.

This profit would have been more considerable had not the cows been turned in, for they undoubtedly did more mischief than any weekly pay per head, (in reason) could make good: It should be likewise remembered, that this meadow had been mown every year, time out of mind; this may be a disadvantage; I am apt to think it is, according to the common opinion, though we have never been experimentally satisfied of the point.

EXPERIMENT, N<sup>o</sup> 5.

Expences and produce of two acres, field C. 1764.

Rolled in November, and three times in March and April. Fed by various cattle.

EXPENCES.							£.	s.	d.
Rolling,	-	-	-	-	-	-	0	0	8
Rent, &c.	-	-	-	-	-	-	2	0	0
							<hr/>		
							2	0	8
							<hr/>		
PRODUCE.							£.	s.	d.
Keeping 6 horses 4 weeks,	-	-	-	-	-	-	1	16	0
— 4 cows 5 ditto,	-	-	-	-	-	-	1	10	0
— 30 sheep 4 ditto	-	-	-	-	-	-	1	5	0
							<hr/>		
							4	11	0
Expences,	-	-	-	-	-	-	2	0	8
							<hr/>		
Profit,	-	-	-	-	-	-	2	10	4
Rolling,	-	-	-	-	-	-	0	0	8
							<hr/>		
Clear profit, 1 <i>l.</i> 4 <i>s.</i> 10 <i>d.</i> per acre,	-	-	-	-	-	-	2	9	8
							<hr/>		

## OBSERVATIONS.

The profit of a good piece of grass may not always amount so high as these two acres have done in the years 1763 and 1764; but I believe no loss is ever sustained by it, be the season what it may; the same can by no means be said of the very best arable.

EXPERIMENT, N<sup>o</sup> 6.

Expences and produce of five acres and three roods, field A. 1764.

Rolled in November and April. Mowed four acres three roods of it in July. Produce 7 tons of hay stacked\*.

EXPENCES.							£.	s.	d.
Rolling,	-	-	-	-	-	-	0	1	0
Mowing, at 1 <i>s.</i> 4 <i>d.</i>	-	-	-	-	-	-	0	6	4
Making and stacking,	-	-	-	-	-	-	0	16	0
							<hr/>		
Carried over,							1	3	4

\* I use this expression to shew that it was not weighed out of meadow, but dry out of the stack. There must have been considerably more in the meadow.

	£.	s.	d.
Brought over,	1	3	4
Rent, &c.	5	15	0
	6	18	4

	PRODUCE.	£.	s.	d.
7 tons of hay, at 35s.	-	12	5	0
Keeping 4 cows 8 weeks,	-	2	8	0
30 sheep 6 ditto,	-	1	17	6
		16	10	6
Expences,	-	6	18	4
Profit,	-	9	12	2
		£.	s.	d.
Rolling,	-	0	1	0
Carting,	-	0	2	9
		0	3	9
Clear profit, 1l. 11s. 10d.	-	9	8	5

EXPERIMENT, N<sup>o</sup> 7.

Expences and produce of six acres, field D. 1764.

Rolled in November twice. Mowed in July. Produce 10 ton of hay stacked.

	EXPENCES.	£.	s.	d.
Rolling,	-	0	1	0
Mowing, at 1s. 4d.	-	0	8	0
Making, &c.	-	1	2	0
		1	11	0
Rent, &c.	-	6	0	0
		7	11	0
	PRODUCE.	£.	s.	d.
10 ton of hay,	-	17	10	0
Keeping 40 sheep 4 weeks,	-	1	13	4
Carried over,		19	3	4
		Brought		

								£.	s.	d.
Brought over,	-	-	-	-	-	-	-	19	3	4
Expences,	-	-	-	-	-	-	-	7	11	0
Profit,	-	-	-	-	-	-	-	11	12	4
							£.	s.	d.	
Rolling,	-	-	-	-	-	-	0	1	0	
Carting,	-	-	-	-	-	-	0	2	10½	
								0	3	10½
Clear profit, 1l. 18s. 1d. per acre,	-	-	-	-	-	-		11	8	5½

EXPERIMENT, N<sup>o</sup> 8.

Expences and produce of three acres, three roods, field B. 1764.

Rolled it in November and April. Fed by various cattle.

EXPENCES.							£.	s.	d.
Rolling,	-	-	-	-	-	-	0	0	8
Rent, &c.	-	-	-	-	-	-	3	15	0
							3	15	8
PRODUCE.							£.	s.	d.
Keeping 1 horse 23 weeks	-	-	-	-	-	-	1	13	6
4 cows 8 weeks,	-	-	-	-	-	-	2	8	0
40 sheep 5 weeks,	-	-	-	-	-	-	2	1	4
6 heifers 4 weeks,	-	-	-	-	-	-	1	16	0
							7	18	10
Expences,	-	-	-	-	-	-	3	15	8
Profit,	-	-	-	-	-	-	4	3	2
Rolling,	-	-	-	-	-	-	0	0	8
Clear profit, 19s. 10d. per acre,	-	-	-	-	-	-	4	2	6

## OBSERVATIONS.

The four experiments of the year 1764 are fresh and important proofs of the great profit of grass lands. N<sup>o</sup> 8 would have been more advantageous mown than fed, for the quantity of grass was equal to N<sup>o</sup> 7, but the feeding

ing at the prices of the country is not so beneficial as making hay; my opinion, however, was then different, which induced me in both these years, (as well as some succeeding ones) to take in joist cattle by the week. I should observe here, that both 1763 and 1764 were favourable years to the crops of hay.

EXPERIMENT, N<sup>o</sup> 9.

Expences and produce of six acres, field D. 1765.

In November 1764, manured a part of the field with seventy loads of pond mud, which was well harrowed in; and then rolled the whole twice. June 24th, mowed it; produce 5 ton in stack. The whole summer almost a burning drought.

EXPENCES.						£.	s.	d.
Emptying the pond,	-	-	-	-	-	7	10	0
Turning over the mud	-	-	-	-	-	0	9	0
Filling, spreading, &c. &c.	-	-	-	-	-	0	15	0
						<hr/>		
Rolling,	-	-	-	-	-	8	14	0
Mowing,	-	-	-	-	-	0	1	0
Making, &c.	-	-	-	-	-	0	8	0
						<hr/>		
						9	19	0
Rent, &c.	-	-	-	-	-	6	0	0
						<hr/>		
						15	19	0
						<hr/>		

PRODUCE.						£.	s.	d.
5 ton of hay at 50s.	-	-	-	-	-	12	10	0
Keeping 6 horses 1 week,	-	-	-	-	-	0	9	0
						<hr/>		
						12	19	0
						<hr/>		

	£.	s.	d.
Expences,	15	19	0
Produce,	12	19	0
Carried over,	<hr/>		
	3	0	0

Brought



	£.	s.	d.	£.	s.	d.
Brought over,	-	-	-	3	0	0
Carting manure,	-	-	-	0	13	0
Harrowing,	-	-	-	0	3	4½
Rolling,	-	-	-	0	1	0
				<hr/>	0	17 4½
Total loss, 12s. 10½d. per acre,	-	-	-		3	17 4½

## OBSERVATIONS.

It is very remarkable, and proves the regular profit of pasture lands, that with the accumulated charge of a very dear manuring, in so dry a year, that no benefits could be received from it, so little loss should accrue from this crop! The pond emptying was paid doubly too dear for;—no benefit resulted from the mud;—the season a parching one;—and yet only 12s. an acre lost by it. If the manuring had been omitted, there would have remained 20s. an acre profit.

EXPERIMENT, N<sup>o</sup> 10.

Expences and produce of two acres, field C. 1765.

Rolled in November and in April, fed off by various cattle.

EXPENCES.							£.	s.	d.
Rolling,	-	-	-	-	-	-	0	0	4
Rent, &c.	-	-	-	-	-	-	2	0	0
							<hr/>	2	0 4
PRODUCE.							£.	s.	d.
Keeping 6 horses 1 week,	-	-	-	-	-	-	0	2	0
— 4 cows 3 ditto,	-	-	-	-	-	-	0	18	0
— 40 sheep 6 ditto,	-	-	-	-	-	-	2	10	0
							<hr/>	3	17 0
Expences,	-	-	-	-	-	-	2	0	4
Profit,							<hr/>	1	16 8
Rolling,	-	-	-	-	-	-	0	0	4
Clear profit, 18s. 2d. per acre,	-	-	-	-	-	-	<hr/>	1	16 4

OBSERVATION.

OBSERVATIONS.

The profit of this piece of land falling off so much, was owing merely to the excessive dryness of the season; it is astonishing that there should be any profit at all in years when (however well the cattle thrive) the surface appears almost burnt up; besides wanting the shade of a crop left for hay, the produce must be proportionably less.

EXPERIMENT, N<sup>o</sup> 11.

Expences and produce of five acres three roods, field A, 1765.

Rolled in November and February. Mowed it the 26th of June. Produce 4 ton, 17 cwt. stacked, or *per acre* 17 cwt.

EXPENCES.

	£.	s.	d.
Rolling, - - - - -	0	1	0
Mowing, - - - - -	0	7	8
Making, &c. - - - - -	0	17	6
	1	6	2
Rent, &c. - - - - -	5	15	0
	7	1	2

PRODUCE.

	£.	s.	d.
4 ton, 17 cwt. of hay at 50s.	12	2	6
Keeping 20 sheep 3 weeks,	0	12	6
----- 4 cows 1 week,	0	6	0
	13	1	0
Expences, - - - - -	7	1	2
Profit, . - - - - -	5	19	10
	£.	s.	d.
Rolling, - - - - -	0	1	0
Carting, - - - - -	0	4	9
	0	5	9
Clear profit, 19s. 5d. <i>per acre</i> ,	5	14	1

## OBSERVATIONS.

We find that this field not having the weight of manuring in its account, which burthened the last experiment, produced a profit of 1*l.* per acre, which in so dry a year is certainly very considerable. Every experiment I register is but a fresh proof of the profit of pasture lands.

EXPERIMENT, N<sup>o</sup> 12.

Expences and produce of three acres three roods, field B. 1765.

Rolled in November twice. Mown the 24th of June. Produce 3 tons of hay stacked.

EXPENCES.						£.	s.	d.
Rolling,	-	-	-	-	-	0	0	8
Mowing,	-	-	-	-	-	0	5	0
Making, &c.	-	-	-	-	-	0	12	0
						<hr/>		
						0	17	8
Rent, &c.	-	-	-	-	-	3	15	0
						<hr/>		
						4	12	8
PRODUCE.						£.	s.	d.
3 ton at 50 <i>s.</i>	-	-	-	-	-	7	10	0
Keeping 20 sheep 2 weeks	-	-	-	-	-	0	8	4
2 horses 1 ditto	-	-	-	-	-	0	3	0
						<hr/>		
						8	1	4
Expences,	-	-	-	-	-	4	12	8
						<hr/>		
Profit,	-	-	-	-	-	3	8	8
						<hr/>		
						£.	s.	d.
Rolling,	-	-	-	-	-	0	0	7½
Carting,	-	-	-	-	-	0	3	1½
						<hr/>		
						0	3	9
						<hr/>		
						3	4	1
						<hr/>		
						3	4	1

Clear profit, 17*s.* 1*d.* per acre;

## OBSERVATIONS.

This experiment and the other three of the year 1765, prove in a striking manner the regular and almost certain profit of grass lands; since one would imagine

imagine if any cause was powerful enough to render them otherwise, it would be that of so burning a season as this, yet we find in every instance but one (and in that a particular reason operated against it) a considerable profit *per acre*, whether the fields were fed or mown.

EXPERIMENT, N<sup>o</sup> 13.

Expences and produce of two acres, field C. 1766.

Rolled in November and March. Fed by various cattle.

EXPENCES.										£.	s.	d.
Rolling,	-	-	-	-	-	-	-	-	-	0	0	4
Rent, &c.	-	-	-	-	-	-	-	-	-	2	0	0
										<hr/>		
										2	0	4
										<hr/>		
PRODUCE.										£.	s.	d.
Keeping 60 sheep 2 weeks,	-	-	-	-	-	-	-	-	-	1	5	0
6 cows 3 ditto,	-	-	-	-	-	-	-	-	-	1	7	0
9 horses 2 ditto,	-	-	-	-	-	-	-	-	-	1	7	0
										<hr/>		
										3	19	0
Expences,	-	-	-	-	-	-	-	-	-	2	0	4
										<hr/>		
Profit,	-	-	-	-	-	-	-	-	-	1	18	8
Rolling,	-	-	-	-	-	-	-	-	-	0	0	4
										<hr/>		
Clear profit, 19s. 2d. per acre,										1	18	4
										<hr/>		

EXPERIMENT, N<sup>o</sup> 14.

Expences and produce of six acres, field D. 1766.

Rolled in November. Mown the 1st of July. Produce 12 tons stacked.

EXPENCES.										£.	s.	d.
Rolling,	-	-	-	-	-	-	-	-	-	0	0	6
Mowing,	-	-	-	-	-	-	-	-	-	0	8	0
Making, &c.	-	-	-	-	-	-	-	-	-	0	17	9
										<hr/>		
										1	6	3
Rent, &c.	-	-	-	-	-	-	-	-	-	6	0	0
										<hr/>		
										7	6	3
										<hr/>		
										PRODUCE.		

PRODUCE.						£.	s.	d.
12 tons of hay at 42s. 6d.	-	-	-	-	-	25	10	0
Keeping 60 sheep 2 weeks,	-	-	-	-	-	1	5	0
3 horses 1 week,	-	-	-	-	-	0	4	6
4 heifers 2 ditto,	-	-	-	-	-	0	12	0
						27	1	6
Expences,	-	-	-	-	-	7	6	3
Profit,	-	-	-	-	-	19	15	3
						£.	s.	d.
Rolling,	-	-	-	-	-	0	0	6
Carting,	-	-	-	-	-	0	5	0
						0	5	6
Clear profit, 3l. 4s. 11d. per acre,	-	-	-	-	-	19	9	9

## OBSERVATIONS.

From the large product of this crop I conclude the manure laid on a part of the field in 1764, was attended with effect this year, though I could not perceive any difference at the time of mowing. The wetness of the season worked greatly in favour of the crop, which was extremely large, and the profit very great. Arable land, even after a year of fallow, will seldom, very seldom, equal the *product* of this field, without deductions of rent on either side.

EXPERIMENT, N<sup>o</sup> 15.

Expences and produce of three acres and three roods, field B. 1766.

Rolled in autumn and spring; mown in July; product 6 ton, 10 cwt. of stacked.

EXPENCES.						£.	s.	d.
Rolling,	-	-	-	-	-	0	0	8
Mowing,	-	-	-	-	-	0	5	0
Making, &c.	-	-	-	-	-	0	12	9
Carrying out,	-	-	-	-	-	0	7	2
Weighing,	-	-	-	-	-	0	6	0
Turnpike and beer,	-	-	-	-	-	0	4	0
Rent, &c.	-	-	-	-	-	3	15	0
						5	10	5
						PRODUCE.		

PRODUCE.				£.	s.	d.
6 tons, 10 cwt. at 45s	-	-	-	14	12	6
Keeping 6 cows 2 weeks,	-	-	-	0	18	0
2 horses ditto,	-	-	-	0	6	0
20 sheep ditto,	-	-	-	0	4	2
				16	0	8
Expences,	-	-	-	5	10	5
Profit,	-	-	-	10	10	3
				£.	s.	d.
Rolling,	-	-	-	0	0	7
Carting,	-	-	-	1	6	9½
				1	7	4½
Clear profit, 2l. 8s. 8d. per acre,	-	-	-	9	2	10½

EXPERIMENT, N<sup>o</sup> 16.

Expences and produce of five acres three roods, field A. 1766.

Rolled twice in November. Mowed in July. Produce 9 tons, 5 cwt. stacked, or per acre, 1 ton, 12 cwt.

EXPENCES.				£.	s.	d.
Rolling,	-	-	-	0	1	0
Mowing,	-	-	-	0	7	8
Making, &c.	-	-	-	0	14	0
Carrying out,	-	-	-	0	9	6
Weighing,	-	-	-	0	9	0
Turnpike and beer,	-	-	-	0	6	6
				2	4	8
Rent, &c.	-	-	-	5	15	0
				7	19	8

PRODUCE.

	PRODUCE.	£.	s.	d.
9 ton, 5 cwt. at 45s.	-	21	16	0
Keeping 6 cows 2 weeks,	-	0	18	0
	Carried over,	22	14	0

Brought



PRODUCE.						£.	s.	d.
10 ton, 8 cwt. at 25s. out of the meadow,	-	-	-	-	-	13	0	0
Keeping 60 sheep 2 weeks,	-	-	-	-	-	1	5	0
						14	5	0
Expences,	-	-	-	-	-	6	11	11
Profit,	-	-	-	-	-	7	13	1
						£.	s.	d.
Rolling,	-	-	-	-	-	0	0	5
						1	15	8½
						0	16	1½
Clear profit, 1l. 7s. 4½d. per acre,	-	-	-	-	-	6	16	11½

# OBSERVATIONS.

If the reader turns to the table of the fields, he will find this by no means equal to the four I have hitherto registered : it is not only perfectly flat, but very wet, and was never drained, nor had it received any manure for many years. But notwithstanding these circumstances, it this year yielded a very beneficial crop of hay ; and proved one of the most profitable pieces of land in the farm. Others of the same nature and condition, but arable, made me feel very sensibly the difference between bad arable and bad grass land.

## EXPERIMENT, N<sup>o</sup> 18.

Expences and produce of two acres and a half, field M. 1766.

Mowed in July ; produce 3 tons flacked, or per acre 1 ton, 4 cwt.

EXPENCES.						£.	s.	d.
Mowing,	-	-	-	-	-	0	3	4
Making,	-	-	-	-	-	0	5	0
						0	8	4
Rent, &c.	-	-	-	-	-	2	2	6
						2	10	10
PRODUCE.						£.	s.	d.
3 Tons, at 42s. 6d.	-	-	-	-	-	6	7	6
Keeping two large oxen two weeks,	-	-	-	-	-	0	10	0
Carried over,	-	-	-	-	-	6	17	6
						Brought		



	£.	s.	d.
Brought over,	6	17	6
Keeping 20 sheep two weeks,	0	8	10
	7	6	4
Expences,	2	10	10
Profit 1 <i>l.</i> 18 <i>s.</i> <i>per</i> acre,	4	15	6
Carting,	0	2	1
Clear profit, 1 <i>l.</i> 17 <i>s.</i> 4 <i>d.</i> <i>per</i> acre,	4	13	5

## OBSERVATIONS.

This field, being another of my secondary ones, proved in point of profit equal to the best in the farm. The favourableness of the season, which was extremely wet, did much for the crops of grafs; but to whatever we attribute it, the profit is certainly considerable, and becomes one link of that important chain of proofs, of the vast advantages of grafs lands.

EXPERIMENT, N<sup>o</sup> 19.

## Expences and Produce of 3½ acres, field E. 1766.

In the winter of 1765, I hollow drained this field, manured it from a compost hill with fifty-six loads (each forty bushels) besides one waggon load of lime and hair from a tanner's, and soot from a chimney sweeper's, half of each. Mowed it the middle of July; produce 7 tons of hay in stack, or *per* acre 2 tons.

	EXPENCES.	£.	s.	d.
Expences of the drains,	- - - - -	6	13	8
Labour in the manuring,	- - - - -	0	14	0
Soot and lime,	- - - - -	1	4	9
		8	12	5
Mowing,	- - - - -	0	4	8
Making, &c.	- - - - -	0	9	0
		9	6	1
Rent, &c.	- - - - -	2	19	6
		12	5	7

## PRODUCE

## •PRODUCE.

	£.	s.	d.
7 Tons of hay, at 42s. 6d.	14	17	6
Keeping 2 large oxen 3 weeks,	0	15	0
6 cows 2 ditto,	0	18	0
	16	10	6
Expences,	12	5	7
Profit 1l. 4s. <i>per acre</i> ,	4	4	11
	£.	s.	d.
Carting manure,	0	17	7½
Ditto hay,	0	2	11
	1	0	6½
Clear profit, 18s. 4d. <i>per acre</i> ,	3	4	4½

## OBSERVATIONS.

This experiment contains the greatest encouragement for those who improve indifferent pastures that is possible ; for I consider the paying all expences of so lasting an improvement as hollow draining, with the produce of a single crop, besides those of a plentiful manuring, and the common ones of culture and rent besides, and leaving, after all, a profit of 18s. *per acre*, as an instance pregnant with important lessons. Much of the success was doubtless owing to the wetness of the season, which washed in the manure without forfeiting the soil, as the drains carried off the pernicious surplus of water after the good was done ; but yet the capability of being so paid, and receiving such profit the first year, is of very great consequence ; nor would the product probably have been at all trifling, even in an unfavourable year. Many of these experiments give the greatest reason for such a supposition.

EXPERIMENT, N<sup>o</sup> 20.

Expences and produce of three acres, field F. 1766.

As this field is not only a thoroughfare, but has many large spreading oaks growing about it, it was never mown ; nor did I roll it, for the same reason.

EXPENCES.	£.	s.	d.
Rent, &c.	2	11	0
PRODUCE.	£.	s.	d.
Keeping 2 oxen 8 weeks,	2	0	0
4 heifers 6 ditto,	1	16	0
Carried over,	3	16	0
Vol. II.	Y y	Brought	

	£.	s.	d.
Brought over, - - - - -	3	16	0
Keeping 60 sheep 5 ditto, - - - - -	3	2	6
	6	18	6
Expences, - - - - -	2	11	0
Clear profit, 1 <i>l.</i> 9 <i>s.</i> 2 <i>d.</i> per acre, - - - - -	4	7	6

EXPERIMENT N<sup>o</sup> 21.

Expences and produce of 2½ acres, field H. 1766.

This field could not be rolled nor mown, for mole-hills and bushes.

EXPENCES.				£.	s.	d.
Rent, &c. - - - - -	-	-	-	2	2	6
PRODUCE.				£.	s.	d.
Keeping 4 heifers 4 weeks, - - - - -	-	-	-	1	4	0
—— 6 cows 3 ditto, - - - - -	-	-	-	1	7	0
—— 4 horses 3 ditto, - - - - -	-	-	-	0	18	0
—— 60 sheep 2 ditto, - - - - -	-	-	-	1	5	0
				4	14	0
Expences, - - - - -	-	-	-	2	2	6
Profit, 1 <i>l.</i> per acre, - - - - -	-	-	-	2	11	6

EXPERIMENT, N<sup>o</sup> 22.

Expences and produce of six acres, field G. 1766.

Nearly in as bad condition as N<sup>o</sup> 21. It was never rolled; nor do I know of its ever having been mown.

EXPENCES.				£.	s.	d.
Rent, &c. - - - - -	-	-	-	5	2	0
PRODUCE.				£.	s.	d.
Keeping 60 sheep 4 weeks, - - - - -	-	-	-	2	10	0
—— 40 ditto 2 ditto, - - - - -	-	-	-	0	16	8
—— 4 horses 3 ditto, - - - - -	-	-	-	0	18	0
Carried over, - - - - -	-	-	-	4	4	8
				Brought		

	£.	s.	d.
Brought over, - - - - -	4	4	8
Keeping 4 heifers, 5 ditto, - - - - -	1	10	0
—— 6 cows 2 ditto, - - - - -	0	18	0
—— 4 colts 8 ditto, - - - - -	1	12	0
	8	4	8
Expences, - - - - -	5	2	0
Profit 10s. 5d. per acre, - - - - -	3	2	8

EXPERIMENT, N<sup>o</sup> 23.

Expences and produce of five acres, field K. 1766.

EXPENCES.				£.	s.	d.
Rent, &c. - - - - -	-	-	-	4	5	0
PRODUCE.				£.	s.	d.
Keeping 2 oxen 2 weeks, - - - - -	-	-	-	0	10	0
—— 6 cows 4 ditto, - - - - -	-	-	-	1	16	0
—— 4 heifers 3 ditto, - - - - -	-	-	-	0	18	0
—— 4 colts 2 ditto, - - - - -	-	-	-	0	8	0
—— 9 horses 2 ditto, - - - - -	-	-	-	1	7	0
—— 60 sheep 3 ditto, - - - - -	-	-	-	1	17	6
				6	16	6
Expences, - - - - -	-	-	-	4	5	0
Profit, 10s. 3d. per acre, - - - - -	-	-	-	2	11	6

EXPERIMENT, N<sup>o</sup> 24.

Expences and produce of 3½ acres, field L. 1766.

EXPENCES.				£.	s.	d.
Rent, &c. - - - - -	-	-	-	2	19	6
PRODUCE.				£.	s.	d.
Keeping 2 oxen 2 weeks, - - - - -	-	-	-	0	10	0
—— 6 cows 2 ditto, - - - - -	-	-	-	0	18	0
Carried over, - - - - -	-	-	-	1	8	0

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Brought

	£.	s.	d.
Brought over,	1	8	0
Keeping 3 horses 5 ditto,	1	2	6
40 sheep 6 ditto,	2	10	0
	5	0	6
Expences,	2	19	6
Profit, 11s. 8d. per acre,	2	1	0

## OBSERVATIONS.

These four experiments being much of the same nature and result, I have thrown them together that the same remarks might not be uselessly repeated. It is very observable from them that the profit of grass land is not confined to the good lands alone; these pastures, in appearance, are extreme poor and wet ones much over-run with rubbish, and never mentioned by a farmer or a labourer without a significant shake of the head; but expence runs so low upon grass, that the keeping of a few cattle pays it with some profit. When no deductions whatever remain to be made, ten or eleven shillings per acre is no trifle, and would figure greatly among the worst of the arable crops. Nor should I omit remarking that had the surface of these pastures been levelled and the bushes extirpated, so that they might have been mown (a business I partly effected the winter following) the produce in hay would have turned out greater than by feeding at the above prices, and this without any draining or manuring.

EXPERIMENT, N<sup>o</sup> 25.

Expences and produce of two acres, field C. 1767.

Rolled in November and April. Fed by various cattle.

EXPENCES.				£.	s.	d.
Rolling,	-	-	-	0	0	4
Rent, &c.	-	-	-	2	0	0
				2	0	4
PRODUCE.				£.	s.	d.
Keeping 2 oxen 4 weeks,	-	-	-	1	0	0
6 cows and heifers 3 ditto,	-	-	-	1	7	0
Carried over,	-	-	-	2	7	0
				Brought		

	£.	s.	d.
Brought over,	2	7	0
Keeping 4 horses 5 ditto,	1	10	0
80 sheep 3 ditto,	2	10	0
	6	7	0
Expences,	2	0	4
Profit,	4	6	8
Rolling,	0	0	4
Clear profit, 2l. 3s. 2d. per acre,	4	6	4

### OBSERVATIONS.

The year 1767 as well as the preceding one was greatly favourable to the crops of grafs, and could scarcely fail of producing a considerable profit upon this choice piece of land. It could not be mowed, otherwise it would have proved in any of these years much more beneficial.

### EXPERIMENT, N<sup>o</sup> 26.

Expences and produce of six acres, field D. 1767.

Rolled in November and March. Mown for hay the 25th of July.  
Produce in the field 13 ton, 6 cwt. 2 qr. or per acre, 2 tons, 4 cwt. 1 qr.

	EXPENCES.	£.	s.	d.
Rolling,	- - - - -	0	1	0
Mowing,	- - - - -	0	8	0
Making,	- - - - -	1	3	3
Carrying,	- - - - -	0	10	9
Weighing,	- - - - -	0	11	8
Turnpike and beer,	- - - - -	0	8	6
		3	3	2
Rent, &c.	- - - - -	6	0	0
		9	3	2
	PRODUCE.	£.	s.	d.
13 ton, 6 cwt. 2 qrs. of hay, at 26s.		17	6	4
Lett the after feed for		1	10	0
Carried over,		18	16	4
		Brought		

	£.	s.	d.
Brought over, - - - - -	18	16	4
Expences, - - - - -	9	3	2
Profit, - - - - -	9	13	2
	£.	s.	d.
Rolling, - - - - -	0	1	0
Carting, - - - - -	2	2	10½
	2	3	10½
Clear profit, 1l. 4s. 10d. per acre, - - -	7	9	3½

## OBSERVATIONS.

This crop, though very considerable, was not near equal to that of 1766, for 13 ton would never have come out of the stack any thing like 12, the product in dry hay last year: and if it had, the price would not have been near so high. Nevertheless this is a noble crop of hay, and the profit such as to be a fresh and convincing proof of the excellency of good pastures.

EXPERIMENT, N<sup>o</sup> 27.

Expences and produce of 5 acres, 3 roods, field A. 1767.

Rolled in November and March. Mown for hay the 31st of July. Produce 11 ton, 10 cwt. 2 qrs. or per acre, 2 tons, 2 cwt.

EXPENCES.				£.	s.	d.
Rolling, - - - - -	-	-	-	0	1	0
Mowing, - - - - -	-	-	-	0	7	8
Making, - - - - -	-	-	-	0	13	1
Carrying, - - - - -	-	-	-	0	7	3
Weighing, - - - - -	-	-	-	0	9	6
Turnpike and beer, - - - - -	-	-	-	0	6	4
				2	4	10
Rent, &c. - - - - -	-	-	-	5	15	0
				7	19	10
PRODUCE.				£.	s.	d.
11 ton, 10 cwt. 2 qrs. of hay at 26s. - - -	-	-	-	15	0	0
Keeping 2 oxen 3 weeks, - - - - -	-	-	-	0	15	0
Carried over, - - - - -	-	-	-	15	15	0
				Brought		

	£.	s.	d.
Brought over,	15	15	0
Keeping 6 cows and heifers 2 weeks,	0	18	0
4 horses 2 ditto,	0	12	0
Expences,	7	19	10
Profit,	9	5	2
Rolling,	0	1	0
Carting,	2	1	1
Clear profit, 1l. 4s. 8d. per acre,	7	3	1

EXPERIMENT, N<sup>o</sup> 28.

Expences and produce of three acres three roods, field B. 1767.

Rolled in November and March. Mown for hay the 5th of August.  
Produce 5 tons, 12 cwt. or per acre 1 ton, 8 cwt.

EXPENCES.				£.	s.	d.
Rolling,	-	-	-	0	0	8
Mowing,	-	-	-	0	4	0
Making,	-	-	-	0	11	11
Carrying,	-	-	-	0	5	0
Weighing,	-	-	-	0	6	0
Turnpike and beer	-	-	-	0	4	3
Rent, &c.	-	-	-	1	11	10
				3	15	0
				5	6	10
PRODUCE.				£.	s.	d.
5 Tons, 12 cwt. at 26s.	-	-	-	7	5	7
Keeping 2 oxen 1 week,	-	-	-	0	5	0
6 cows and heifers, 3 ditto,	-	-	-	1	7	0
Expences,	-	-	-	8	17	7
Profit,	-	-	-	5	6	10
				3	10	9

Brought



	£.	s.	d.
Brought over,	-	-	3 10 9
	£.	s.	d.
Rolled,	0	0	7
Carting,	1	6	9½
			<hr/> 1 7 4½
Clear profit, 11s. 4d. per acre,	-	-	<hr/> 2 3 4½

## OBSERVATIONS.

These two fields, particularly the last, are this year much inferior to their product the last, notwithstanding the benefit of an advantageous season, the price however is by no means equal to the former one; and I should observe, that the extreme wetness of the season not only run up the expences of making, but probably decreased the weight of the hay. The profit, however, is inconsiderable only on comparison with the same field in other years, for in itself it certainly is of importance. These four fields, it may be further remarked, A. B. C. and D. have now for five years continued to yield a very considerable annual profit, in whatever way managed, whether fed by great cattle or by sheep; or when mown, whether the hay has been fold out of the field or stacked at home, at the chance of common prices; and some have been but low, but one year that it could be called *high*. This is a great argument in favour of grass lands, that they are regular, and pretty sure in their returns, with no such deep deductions as fallow years in arable fields.

EXPERIMENT N<sup>o</sup> 29.

Expences and produce of three acres and a half, field E, 1767.

Rolled in November and in March; mown the 12th of August. Produce 7 tons, 17 cwt. of hay stacked, or *per acre* 2 tons, 5 cwt.

	EXPENCES.	£.	s.	d.
Rolling,	- - - - -	0	0	7
Mowing,	- - - - -	0	4	8
Making, &c.	- - - - -	0	10	6
		<hr/> 0	15	9
Rent, &c.	- - - - -	2	19	6
		<hr/> 3	15	3
				PRODUCE.

PRODUCE.						£.	s.	d.
7 Tons, 17cwt. of hay at 34s. 6d. per ton, at the stack,	-	-	-	-	-	13	11	0
Keeping 2 oxen 2 weeks,	-	-	-	-	-	0	10	0
——— 4 cows 3 ditto,	-	-	-	-	-	0	18	0
——— 3 horses 2 ditto,	-	-	-	-	-	0	9	0
						15	8	0
Expences,	-	-	-	-	-	3	15	3
Profit,	-	-	-	-	-	11	12	9
						£.	s.	d.
Rolling,	-	-	-	-	-	0	0	7
Carting,	-	-	-	-	-	0	2	11
						0	3	6
Clear profit, 3l. 5s. 4d. per acre,	-	-	-	-	-	11	9	3

## OBSERVATIONS.

This second year's product, after the draining and manuring, is a fresh proof of the profit resulting from the improvement of such pasture lands as this field. The return the soil made in these two crops is really great; nor can all the reasoning in the world speak so efficaciously the expediency of hollow draining and manuring such flat wet soils, as these two experiments.

EXPERIMENT, N<sup>o</sup> 30.

Expences and produce of 3 acres, field F. 1767.

EXPENCES.						£.	s.	d.
Rent, &c.	-	-	-	-	-	2	11	0
PRODUCE.						£.	s.	d.
Keeping 2 oxen 4 weeks,	-	-	-	-	-	1	0	0
——— 6 cows and heifers, 5 ditto,	-	-	-	-	-	2	5	0
——— 40 sheep 5 ditto,	-	-	-	-	-	2	1	8
						5	6	8
Expences,	-	-	-	-	-	2	11	0
Profit, 18s. 6d. per acre,	-	-	-	-	-	2	15	8

EXPERIMENT, N<sup>o</sup> 31.

Expences and produce of 2½ acres, field H. 1767.

EXPENCES.							£.	s.	d.
Rent, &c.	-	-	-	-	-	-	2	2	6
PRODUCE.							£.	s.	d.
Keeping 80 sheep 5 weeks,	-	-	-	-	-	-	4	3	4
4 colts 4 ditto,	-	-	-	-	-	-	0	16	0
							4	19	4
Expences,	-	-	-	-	-	-	2	2	6
Profit, 1 <i>l.</i> 2 <i>s.</i> 8 <i>d.</i> per acre,	-	-	-	-	-	-	2	16	10

EXPERIMENT, N<sup>o</sup> 32.

Expences and produce of 6 acres field G. 1767

EXPENCES.							£.	s.	d.
Rent, &c.	-	-	-	-	-	-	5	2	0
PRODUCE.							£.	s.	d.
Keeping 6 cows and heifers 5 weeks,	-	-	-	-	-	-	2	5	0
8 horses 2 weeks,	-	-	-	-	-	-	1	4	0
4 colts 2 ditto	-	-	-	-	-	-	0	8	0
3 ditto 7 ditto,	-	-	-	-	-	-	1	1	0
80 sheep 3 ditto,	-	-	-	-	-	-	2	10	0
40 ditto 5 ditto,	-	-	-	-	-	-	2	1	8
							9	9	8
Expences,	-	-	-	-	-	-	5	2	0
Profit, 14 <i>s.</i> 7 <i>d.</i> per acre,	-	-	-	-	-	-	4	7	8

## OBSERVATIONS.

The crops of G. H. and F. this year, though they form no striking figure, are yet very considerable. If we reflect on the nature of the soil, 18*s.* 6*d.* 1*l.* 2*s.* 8*d.* and 14*s.* 7*d.* are by no means trivial sums *per acre*, when neat, without any unspecified deductions, from the worst pastures in the farm; I cannot avoid concluding from these three experiments, what

what I have so often deduced already, that the profit of pasture lands of every kind is not only very considerable in itself, but much superior to what is commonly imagined; and that from a want of farmers keeping a register of the hay they make, and the cattle their fields maintain.

EXPERIMENT, N<sup>o</sup> 33.

Expences and produce of  $3\frac{1}{2}$  acres, field L. 1767.

The bushes were grubbed up in November, after which it was rolled. In the beginning of February 60 loads, (40 bushels each) of compost, (rack yard dung and ditch stuff mixed well together) were spread on it, and harrowed in. Mowed it August 7th. Produce 6 ton, 6 cwt. 2 qrs. or *per* acre, 1 ton, 16 cwt.

## EXPENCES.

	£.	s.	d.
Rolling, - - - - -	0	0	4
Labour and manuring, - - - - -	0	15	0
Mowing, - - - - -	0	4	8
Making, &c. - - - - -	0	8	11
Carrying, weighing, turnpike and beer, - - - - -	0	11	11
	<hr/>		
	2	0	10
Rent, &c. - - - - -	2	19	6
	<hr/>		
	5	0	4
	<hr/>		

## PRODUCE.

	£.	s.	d.
6 ton, 6 cwt. 2 qrs. at 26s. - - - - -	8	4	6
Keeping 3 heifers 3 weeks, - - - - -	0	13	6
----- 4 horses ditto, - - - - -	0	18	0
	<hr/>		
	9	16	0
Expences, - - - - -	5	0	4
	<hr/>		
Profit, 1l. 7s. 4d. <i>per</i> acre, - - - - -	4	15	8
	<hr/>		
	£.	s.	d.
Rolling, - - - - -	0	0	3 $\frac{1}{2}$
Manuring, - - - - -	0	10	5
Carting, - - - - -	1	5	0
	<hr/>		
	1	15	8 $\frac{1}{2}$
	<hr/>		
Clear profit, 17s. 4d. <i>Per</i> acre - - - - -	2	19	11 $\frac{1}{2}$
	<hr/>		

## OBSERVATIONS.

This experiment is another proof, and not a trivial one, of the profit of improving these poor pastures. Last year this field yielded but 11s. 8d. profit *per acre*, but now it does more besides paying the manuring; and had it been hollow drained, would doubtless have been much more considerable in a year, so flooded with perpetual rain.

EXPERIMENT, N<sup>o</sup> 34.

Expences and produce of 2½ acres, field M. 1767.

Rolled in November. Manured half of it in February, with 35 loads, (40 bushels) of the same compost as N<sup>o</sup> 33. Mowed it the 11th of August. Produce 5 ton. 10 cwt. in the field, or *per acre* 2 ton, 4 cwt.

EXPENCES.							£.	s.	d.
Rolling,	-	-	-	-	-	-	0	0	3
Labour manuring,	-	-	-	-	-	-	0	9	3
Mowing,	-	-	-	-	-	-	0	3	4
Making,	-	-	-	-	-	-	0	11	9
Carrying, &c. &c. &c.	-	-	-	-	-	-	0	12	7
							<hr/>		
							1	17	2
Rent, &c.	-	-	-	-	-	-	2	2	6
							<hr/>		
							3	19	8
							<hr/>		
PRODUCE.							£.	s.	d.
5 ton. 10 cwt. at 26s.	-	-	-	-	-	-	7	3	0
Keeping 50 sheep 2 weeks	-	-	-	-	-	-	1	0	10
							<hr/>		
							8	3	10
Expences,	-	-	-	-	-	-	3	19	8
							<hr/>		
Profit, 1l. 13s. 8d. <i>per acre</i> ,	-	-	-	-	-	-	4	4	2
							<hr/>		
							£.	s.	d.
Rolling,	-	-	-	-	-	-	0	0	2½
Manuring,	-	-	-	-	-	-	0	10	10
Carting,	-	-	-	-	-	-	0	2	1
							<hr/>		
							0	13	1½
							<hr/>		
Clear profit, 1l. 8s. 4d. <i>per acre</i> ,	-	-	-	-	-	-	3	11	0½
							<hr/>		

OBSERVATIONS.

This crop was very large over the whole field, though much best where manured; or the profit could not at so moderate a price have amounted to so much. This experiment should be considered as a fresh argument for the improvement of pasture lands, and a new proof of the great profit resulting from grass in general.

EXPERIMENT, N<sup>o</sup> 35.

Expences and produce of five acres, field K. 1767.

Rolled in March. Mown for hay August 13th Produce 7 tons in the field, or *per acre* 1 ton, 8 cwt.

EXPENCES.							£.	s.	d.
Rolling,	-	-	-	-	-	-	0	0	5
Mowing,	-	-	-	-	-	-	0	6	8
Making, &c.	-	-	-	-	-	-	0	16	2
Carrying,	-	-	-	-	-	-	0	5	6
Weighing,	-	-	-	-	-	-	0	6	0
Turnpike and beer,	-	-	-	-	-	-	0	4	3
							<hr/>		
							1	19	0
Rent, &c.	-	-	-	-	-	-	4	5	0
							<hr/>		
							6	4	0
							<hr/>		
PRODUCE.							£.	s.	d.
7 ton at 26s.	-	-	-	-	-	-	9	2	0
Keeping 50 sheep 4 weeks,	-	-	-	-	-	-	1	0	10
							<hr/>		
							10	2	10
Expences,	-	-	-	-	-	-	6	4	0
							<hr/>		
Profit,	-	-	-	-	-	-	3	18	10
							<hr/>		
							£.	s.	d.
Rolling,	-	-	-	-	-	-	0	0	5
Carting,	-	-	-	-	-	-	1	15	8½
							<hr/>		
							1	16	13½
							<hr/>		
Clear profit, 8s. 6d. <i>per acre</i> ,	-	-	-	-	-	-	2	2	8½
							<hr/>		

EXPERI-

EXPERIMENT, N<sup>o</sup> 36.

Expences and produce of five acres, field N. 1767.

Mown for hay August 5th; the produce 13 ton. 1 cwt. 2 qrs. or *per* acre, 2 ton, 12 cwt. 1 qr.

EXPENCES.				£.	s.	d.
Mowing and making put out at 4s. <i>per</i> acre,	-	-	-	1	0	0
Carrying,	-	-	-	0	8	6
Weighing,	-	-	-	0	11	0
Turnpike and beer,	-	-	-	0	8	3
				<hr/>		
Rent, &c.	-	-	-	2	7	9
	-	-	-	4	5	0
				<hr/>		
				6	12	9
				<hr/>		
PRODUCE.				£.	s.	d.
13 ton. 1 cwt. 2 qrs. at 26s.	-	-	-	17	0	0
Keeping 4 horses 2 weeks,	-	-	-	0	12	0
— 20 sheep ditto,	-	-	-	0	8	10
				<hr/>		
Expences,	-	-	-	18	0	10
	-	-	-	6	12	9
				<hr/>		
Profit	-	-	-	11	8	1
Carting,	-	-	-	1	15	8½
				<hr/>		
Clear profit, 1l. 18s. 5d. <i>per</i> acre,	-	-	-	9	12	4½
				<hr/>		

## OBSERVATIONS.

This was the largest crop of grafs I had this year; and very considerable are both the weight and the profit *per* acre, displaying, like all the rest of these experiments, the vast advantages which a farmer reaps from his grafs lands, though reckoned of but an indifferent quality. N<sup>o</sup> 35, though not near so good a crop as this, yielded for so poor a field no trifling produce.

## GENERAL OBSERVATIONS.

That a clear idea may be entertained of these experiments, I shall in the first place throw the totals into a table that the averages may be drawn.

## EXPENCES.

## EXPENCES.

Experiment N <sup>o</sup>		l.	s.	d.
1.	Expences <i>per</i> acre fed,	1	0	1
2.	mown,	1	3	4
3.	ditto,	1	7	0
4.	ditto,	1	6	5½
5.	fed,	1	0	8
6.	mown,	1	4	8
7.	ditto,	1	5	9½
8.	fed,	1	0	4
9.	manured and mown,	2	16	0½
10.	fed,	1	0	4
11.	mown,	1	5	4
12.	ditto,	1	5	8
13.	fed,	1	0	4
14.	mown,	1	5	3½
15.	ditto and carried away,	1	16	8
16.	carried,	1	15	0
17.	ditto,	1	9	7½
18.	mown,	1	1	1
19.	manured and drained,	3	16	0½
20.	fed,	0	17	0
21.	ditto,	0	17	0
22.	ditto,	0	17	0
23.	ditto,	0	17	0
24.	ditto,	0	17	0
25.	ditto,	1	0	4
26.	mown and carried,	1	17	10
27.	ditto,	1	15	0
28.	ditto,	1	15	8
29.	mown,	1	2	6
30.	fed,	0	17	0
31.	ditto,	0	17	0
32.	ditto,	0	17	0
33.	manured, mown and carried,	1	18	10½
34.	manured,	1	17	1
35.	carried,	1	12	0½
36.	ditto,	1	13	8½
		50	8	9½

Average, *il.* 12s. 8d. *per* acre.

PRODUCE.



PRODUCE.

Ton. cwt. lb.

£. s. d.

[illegible]

6. 5. 1941

[illegible]

17 point

Upon these tables I must in general remark, that in the whole list there is only one instance of good thorough husbandry, which is N<sup>o</sup> 19, a field well manured and hollow drained; effectually done. And to shew the vast profit of good husbandry on grass lands, the first year of that improvement here registered yielded 18s. 4d. *per acre* clear profit, after paying the expences of manuring, and also those of that permanent improvement, draining: I think a stronger instance can hardly be found. That field was not let to a tenant when I left it, from whence I know the account of the years 1768 and 1769; it paid in those years, clear of all expences, between 3*l.* 10s. and 4*l.* *per acre*; which proves that no money in the world can be better expended than in manuring and draining poor wet pastures.

Six and twenty shillings *per acre* profit may perhaps be thought inconsiderable by those persons who have been used only to rich meadows: but let them consider, that this sum is the average of all mine; the bad as well as the good; let them further consider that I have not a single acre of low meadow: all mine are what we in Suffolk call upland pastures; and three fourths of the preceding fields are in an unimproved state, not a tenth so advantageous as they might be, or as I should have made them, had I remained in Suffolk. By the register, the reader will see that scarcely any of them ever had any manure; and that all other expences ran very low. The average expence, 1*l.* 12s. 8d. including many crops that were carried five or six miles, shews how little was bestowed on them.

Under such circumstances I must be allowed to think that the profit clear of 1*l.* 6s. *per acre* is very considerable. It is far, very far, more than I made by husbandry equally common on my arable lands; all which, with no more proportionable attention than these grass fields received, were attended with loss: so that there is no comparison between them: and let me further observe, that the chances and accidents, to which the crops are open, grass and arable, are in comparison more against the latter than the former; and to so great a degree that I cannot but esteem the parallel absolutely decisive in favour of grass lands. The expences of arable are two or three to one more considerable, which circumstance uniting with the balance of hazard, renders grass much the superior object.

On the other hand, candour requires me to remark, that grass land is by no means susceptible of such great profits as the best husbandry of arable. This fact I could prove in a minute from the preceding books, but the reader who has turned them over with any attention must be sensible of it. Arable crops may, by the perfection of husbandry, be carried to prodigious profit; more I apprehend than grass; but of this I only conjecture, never having tried the effects of a very perfect conduct to grass, except in small spaces of land. If these ideas are just, the scale of comparison will be, *first*, arable land in perfect management; *second*, grass land in middling and in common management; *third*, arable inditto.

But

But there are many circumstances in favour of grass land, which admit of no calculation : such are the ease with which it is conducted—the simplicity of the management—its not being liable to such scenes of knavery as most arable crops ; the farmer of it being cheated I mean—and lastly, the little hazard attending it. All these are circumstances that recommend it to the attention of gentlemen farmers and greatly in preference to arable land. I will venture to assert that an hundred acres of grass may be conducted with less trouble to a gentleman than ten acres of ploughed ground.

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## C H A P. II.

### Of the general Management of GRASS LANDS.

**F**OR the sake of avoiding confusion, I dedicate this chapter to some miscellaneous observations, and a few experiments, that could not with propriety be inserted in the preceding; nor each have a separate one assigned without an affectation of divisions. The points here to be mentioned, are, 1. Feeding and mowing. 2. Rolling. 3. Expences. As to the general conduct of draining, manuring, and preserving free from rubbish, they are either too manifest, or treated under other heads.

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## S E C T. I.

### I. Feeding and Mowing.

**R**ELATIVE to the application of grafs, there are some common opinions, which I heard so often canvassed, or rather asserted, in discourse, that I gave a particular attention to them on my own farm. It has been said more than once that mowing land exhausts it more than feeding; and that pastures should be alternately fed and mown upon the same principle that arable lands

lands are fallowed. I have remarked the effects of both on several of my fields, and also on my neighbours, and therefore I can speak to it from better authority than mere conjecture. Several grass fields in this estate, and some of my own, have been mown every year as long as the labourers remember: I have a minute of two and twenty successive crops of hay in field D. and yet neither that field, nor any of the rest, shew more signs of being exhausted than others on similar soils that have been fed. Here are pastures that have been constantly mown, separated only by a hedge from others that have been often fed; the soil and treatment perfectly alike; and yet the one are to the full as good as the other; nor are the few crops taken from the fed lands better than those from others always mown. I have fed parts of fields, and mown parts, and the year following mown the whole; nor could I ever perceive any difference. I have attended accurately to the effects of both feeding and mowing in a variety of instances, and could never perceive any difference.

So much for the observations I venture to offer concerning the fact; but now let us reason for a moment on it. Why is feeding thought to be so beneficial, as to rank with a fallow? Upon what principles? It can only be the appearance of a large burthen of hay at once upon the ground, that constitutes so strong an idea of a crop: and the notion of cattle in feeding manuring the land greatly. As to the product, it is undoubtedly the same when fed as when mown; only the eating as fast as it grows, prevents the quantity appearing: that the ground yields as much in one case as in the other, cannot for a moment be doubted; the argument is therefore reduced to the manuring received from the cattle in feeding.

That this is not of much consequence I think, there are many reasons to suppose. In the first place, it is not laid on in one body, so as to occasion a fermentation in the soil, which is half the virtue of manures. In the next place, it is dropped at the most improper season in the year, *viz.* summer. It is also in such irregular quantities as generally to do evident mischief. Cattle, while they dung, stand still, and drop the whole in one spot; no grass is there to be found for a twelvemonth; and when it does come, it is often rank, and left uneaten, occasioning great loss unless the scythe follows: and the quantity of land thus destroyed for a season is not inconsiderable: afterwards, if the culture of grass is well attended to, and such places spread, the quantity becomes so small, and the season exhales so much of its virtue, that the benefit is despicable.

Perhaps the treading of heavy cattle is hurtful to the grass; the surface of the ground is too compact and bound without such an addition.

But the land receiving no benefit from feeding, is not the only point: I conceive that a full crop, such as we mow for hay, is of great benefit to it, from being at once on the land. The thick shade in the height of summer breeds a putrid fermentation, opens and loosens the surface; of which any

one may be convinced who examines the surface of two grafs fields, one fed and the other mown; the latter compared to the former is in a state of tillage; and surely it must be a benefit to loosen the soil for the roots and fibres that are in general so bound and matted. These I apprehend are the reasons for the fact I before observed. But extend the argument, and suppose the hay converted to dung in the farm yard, and then carried on to the field in proper quantities, and at a proper season, it is clear enough (all expences carried to account) which method will have the advantage.

Another circumstance in the management of grafs land, is in feeding; whether you should give the cattle much or little at a time; that is, whether if you have several fields to be fed, you should open them all at once to the cattle, or change them from one to another; I answer, the former. Whatever the quantity of grafs, open the gates of all the fields, and let the cattle have them at once; supposing the stock at all proportioned to the quantity of feed. I adhere to this opinion, from observing that my cattle of all sorts have done visibly better when they have had a large range, than when they have had smaller proportions of stock and grafs in both, upon the whole the same. One field of six acres I have found evidently better than two of three each; and I have good reason to believe will carry a greater stock of cattle. And I may further remark, (though it is not my own experience) that an old tenant, on this estate, has for several years made it his practice to open the gates of seven contiguous pastures at once, and turn into them his regular stock of cows, young cattle, and sheep, to feed as they pleased, and found the pasture to go much further so than when he changed them, as he thought they required; and at the same time the cattle were better kept. In both methods the quantity of pasture is the same, the plea therefore of the cattle soiling and trampling more when at large than when confined is false; besides, cattle, particularly sheep, never trample so much as when they want to change their pasture; when used to a change, and confinement to small pieces, they will look for it. But the sagacious animals know best where to feed; they chuse for different times of the day different places to feed, and possess a greater variety than if they had an artificial one.

It is therefore worthy of observation that all the pastures of a farm (unless the quantity is very great) should be but in one piece; with exception of a small close or two near the house, for mere conveniency, of calves,—a sick cow,—or an unruly horse, &c. By such a conduct the ground is made to support more cattle; and if useless hedges are thrown down, in all probability much surface will be gained. If the soil is so wet that it requires small divisions, on account of the ditches draining, then let hollow drains be substituted, or open ditches left without other loss, and bridges of communication for the cattle: in wet lands it is absurd to have small inclosures, for you exclude the sun and wind from half your fields, both which, with a free command, would contribute much to dry them.

## S E C T. II.

## O F R O L L I N G.

**T**HE Reader has observed throughout the experiments of grass fields, that I generally rolled in autumn and spring: I had always entertained a most favourable idea of it, and with much reason, for I never failed remarking that much rolling almost painted the fields, in improving their verdure. I was possessed of no maxim in husbandry clearer than the importance of this practice, and wondered at the farmers for never doing it. Full of this idea, I planned a few experiments in 1766, with design to prove the efficacy of the practice by the superior weight of hay; I accordingly executed them, and the result I shall now lay before the reader.

EXPERIMENT, N<sup>o</sup> 1.

In February 1766, rolled a small part of field D. thrice in a place, and left adjoining to it a part unrolled; both perfectly similar in soil, exposure, &c. Through the spring the part rolled was very distinguishable in colour. Mowed them both for hay; and measuring three square perches very accurately in each, the weight of the grass as soon as cut was as follows:

	lb.
Unrolled,        -        -        -        -        -        -        -        -	297
Rolled,         -        -        -        -        -        -        -        -	264
Superiority,    -        -        -        -        -        -        -        -	33

Thirty-three pounds green on three perches are about  $3\frac{1}{2}$  cwt. of hay *per* acre.

The result of this trial astonished me; I was as clear as possible that the superiority would be on the side of the rolled, and made the experiment merely to decide the degree.

EXPERI-



EXPERIMENT, N<sup>o</sup> 2.

In March 1766, rolled a part of field A. thrice in a place, marked three perches in it, and three adjoining that were not rolled at all. Produce in grafs as soon as cut:

		lb.
Unrolled,	- - - - -	234
Rolled,	- - - - -	197
Superiority,	- - - - -	<u>37</u>

Which is better than 4 cwt. *per* acre of hay.

EXPERIMENT, N<sup>o</sup> 3.

At the same time tried the rolling in another part of field A. the products:

		lb.
Unrolled,	- - - - -	240
Rolled,	- - - - -	206
Superiority,	- - - - -	<u>34</u>

Or better than  $3\frac{1}{2}$  cwt. *per* acre.

These trials surprize me exceedingly; their result being regularly contrary to the idea I had previously formed; and yet the accuracy with which I had attended to the forming them, would leave me no room for doubt.

EXPERIMENT, N<sup>o</sup> 4.

At the same time as N<sup>o</sup> 3, executed the same trial in field N. the products:

		lb.
Unrolled,	- - - - -	207
Rolled,	- - - - -	180
Superiority,	- - - - -	<u>27</u>

Or better than  $2\frac{1}{2}$  cwt. of hay *per* acre.

EXPERIMENT, N<sup>o</sup> 5.

In March 1767, rolled a part of field D. five times, the other parts but once; marked three perches in each, contiguous, and mowed them for hay produce,

Unrolled,	-	-	-	-	-	-	-	-	lb.
Rolled,	-	-	-	-	-	-	-	-	317
									291
Superiority,	-	-	-	-	-	-	-	-	26

Or better than 2½ cwt. of hay *per* acre.

EXPERIMENT, N<sup>o</sup> 6.

At the same time as the preceding experiment tried the like in field A. produce,

Unrolled,	-	-	-	-	-	-	-	-	lb.
Rolled,	-	-	-	-	-	-	-	-	298
									265
Superiority,	-	-	-	-	-	-	-	-	33

Or better than 3½ cwt. *per* acre of hay.

## GENERAL OBSERVATIONS.

For reasons obvious to the practical reader, I should have varied and repeated these trials on all my grass fields, but leaving the farm prevented me. At present I think the supposed advantages of rolling to remain very equivocal; the idea I have of it is so very different from the common opinion, that I shall not venture to be explicit on it; but would earnestly recommend to every one who consults profit, and not beauty alone, to try the point accurately on their own soil before they adhere too positively in favour of the old custom. I must own I have so bad an opinion of the practice, that I shall for the future desist from any other rolling than the mere levelling for the scythe absolutely requires; as I am well convinced that as much is lost in crop as is gained in temporary beauty.

## S E C T. III.

## Of the Expences of GRASS LANDS.

UNDER this head I have only to insert two sketches of the expence of the operations required for grass, in which the team is concerned; they consist of carting the hay at home, and carrying it to market. Manuring, and rolling do not vary from arable lands.

*Carting hay at home.*

1765 and 1766.

	£.	s.	d.
General expences of horses 2s. 6d. a day.* Two carriages will } upon an average clear 4 acres a day, therefore <i>per acre</i> , }	0	0	7½
Repairs of carriages, a waggon and a cart, (the first 7d. and the } other 2½d.) 9½d. <i>per journey</i> therefore <i>per acre</i> , }	0	0	2½
Harnes 1d. <i>per journey</i> , - - - - -	0	0	0¼
	0	0	10

In the proportions of the expences of the years, this will be for

	£.	s.	d.
1763, - - - - -	0	0	7½
1764, - - - - -	0	0	5½

*Carting hay out.*

	1763.	£.	s.	d.
Horses, - - - - -		0	4	8
Harnes, - - - - -		0	0	2½
Waggon, - - - - -		0	1	3
		0	6	1½

\* 1766 is 2s. 7½d. but such minute splitting of farthings should be avoided when it can.

1764.

					£.	s.	d.	£.	s.	d.
Horfes,	-	-	-	-	0	3	9			
Harnesfs,	-	-	-	-	0	0	2½			
Waggon,	-	-	-	-	0	1	3			
					<hr/>			0	5	2½

1765.

					£.	s.	d.			
General expences of horfes,	-	-	-	-	0	5	6			
Harnesfs,	-	-	-	-	0	0	2½			
Repairs,	-	-	-	-	0	1	3			
					<hr/>			0	6	11½

1766.

					£.	s.	d.			
Horfes,	-	-	-	-	0	5	8½			
Harnesfs,	-	-	-	-	0	0	2½			
Waggon,	-	-	-	-	0	1	3			
					<hr/>			0	7	13

END of the NINTH BOOK.



EXPERIMENTAL  
AGRICULTURE.  
BOOK X.  
OF DRAINING.



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B O O K X.

O F D R A I N I N G.

**T**HIS is one of the most important parts of husbandry, and deserves much more attention than the generality of farmers give it. Had I continued some years longer on my Suffolk farm, I should have been able to insert in these minutes the register of a great number of experiments; for I had even marked the courses of several thousand perches of covered drains, which I purposed executing with all convenient speed: however, I am not quite without experience of this part of husbandry, in either grass or arable land; and having been particularly attentive to every circumstance relative to this improvement, I shall be able, though not to reach within many degrees of complete satisfaction, yet to lay before the reader some trials that are more accurate and conclusive than any I have met with in books.

I divide the subject into three parts.

Covered drains.

Open drains.

Water thoroughs.

It is absolutely necessary to treat of these separately, being all of a very different nature.



## C H A P. I.

## OF COVERED DRAINS.

FROM the enquiries I have made concerning the practice of this kind of draining, I find it generally supposed in this part of the kingdom that it began in Essex. It is not of a very old date in this neighbourhood; and as a general practice among good farmers (for our bad and indifferent ones have scarcely any thing to do with it) it has not long been common. The excellencies of it increases the practice every day, insomuch that we have in this neighbourhood more land thus drained in one year than formerly in seven. Indeed much of our soil being clay, or clayey loam, and withal very flat, particularly requires it; and exhibits such a prodigious improvement, that it is wonderful a farmer with any money in his pocket can view the effect, and not immediately practice it.

The methods chiefly used in this neighbourhood are, to dig one spit deep with a common spade; a second spit with a draining spade, narrower than the common one; and a third spit with a yet narrower draining spade, which is only four inches wide at bottom. They then fill them up, to the depth of ten or twelve inches, with refuse faggot wood, called in this country *brash*; or with stones picked off the land, or dug in a gravel pit; upon either of which they lay straw enough to keep the moulds from falling into the interstices of the stones or wood; and then fill up to the level with part of the earth thrown out of the drain, the rest being spread on the land. Sometimes the first spit is ploughed with the common plough, by putting four horses to it, and going twice or thrice in the same furrow, which lowers the expence, otherwise it is no eligible method, because, being generally done in the winter, the poaching of the horses does much mischief. The general depth common in this country is from 26 to 32 inches; 4 inches wide at bottom, and as wide at top, as will just admit the men to work in it. I shall proceed to lay my trials before the reader.

EXPERIMENT, N<sup>o</sup> 1.

The wetness of the year 1764, did much mischief to the spring corn crops on flat moist soils. I had several acres of barley in field T. almost ruined by water. After harvest the stubble in several flat parts of the field was quite dark from the straw of the corn being withered, and even killed by the wet. This determined and enabled me to mark the places where drains were necessary.

I began by drawing a line through the wettest parts; and setting up sticks at those spots that seemed to have collected the water most. Then taking the level of the field, and the surrounding ditches, I cut a drain into the deepest 10 poles long, varying from 3 feet 6 inches to 4 feet 6 inches deep; 3 feet wide at top, and 12 inches at bottom: I made it of these dimensions on account of the large body of water I expected to flow through it; apprehending that all the drains of seven or eight acres would be laid into it. I filled it about 18 inches deep with stones, the largest I could gain from my gravel pit; on the stones I laid a thick layer of straw, and on that threw in part of the earth. About half a pole at the land end of this drain was left open, that I might be able to see in what manner the water from the inferior drains would flow into it: this is a precaution which I cannot but advise all husbandmen to be particular in observing. These 10 poles took 13 loads of stones, (30 bushels).

EXPENCES.				£.	s.	d.
Digging and filling at 6d.	-	-	-	0	5	0
13 loads of stones, stubbing at 1s. 0½d. per load,	-	-	-	0	13	6½
Labour in filling and carting,	-	-	-	0	2	0
Value of the stones *,	-	-	-	0	6	6
Straw,	-	-	-	0	1	0
				1	8	0½
Horses and wear and tear, and carting at 2½d. per load,	-	-	-	0	1	5½
Total, of 2s. 11½d. per pole,	-	-	-	1	9	5½

This drain answered its purpose extremely well; the water from the smaller ones flowed through it without any difficulty, nor did it want any care or repairs while I staid on the farm.

EXPERIMENT, N<sup>o</sup> 2.

The business of N<sup>o</sup> 1. was conducted without any difficulty, but soon after the conclusion of making that drain much rain falling, I found to my

\* This is the price at which they could be sold at the pit, deducting the raising.

so small mortification, that the ditch into which it was laid was not deep enough to carry the water off quick: this was a most unfortunate circumstance, as the surrounding fields were so flat that the business of sinking that ditch was sinking several others, to the amount of at least an hundred perches in length. This was so considerable a difficulty, that to avoid it I reviewed all the surrounding ditches, examined the slopes every way, where any were to be perceived, but my search was in vain; I found my main drain was made in the most advantageous place, and that I must sink a whole range of ditches to carry the water clear off. The necessity of the work was so urgent, that I immediately set five labourers to work in making one hundred and twenty perches ditching: 90 of it 6 feet wide at top, 6 feet deep, and 1 foot wide at bottom. The other 30 perches were 5 feet wide at top, 5 feet deep, and 12 inches wide at bottom. This was a very heavy addition to the expence of my drainage; but the clay that was thrown out being of a good quality, was some recompence, as I shall take a leisure opportunity to carry it on to the adjoining fields.

## EXPENCES.

	£.	s.	d.
Digging a drain 90 perches long at 2s. 6d.	11	5	0
30 ditto at 2s.	3	0	0
	14	5	0

It is to be remarked here, that no farmer, situated on a flat, should, in estimating the expence of covered drains, calculate the amount of them alone, unless he first has viewed the environs of the field with the most attentive eye, and is perfectly satisfied that the water will have a sufficient fall when he has collected it to the mouth of his drain. Broad and deep ditches are of excellent use as fences; and a friend of mine, whose judgment I have a great opinion of, thought that I had arranged this experiment in a wrong place, it being a ditch: but in answer to his sentiment I observed, that one third of the expence would have made me a ditch large enough for an admirable fence; whereas, the size of this was on account of its answering the purpose of a drain. Indeed it would be unfair to charge the whole of this expence to this system of covered drains, because from its situation I shall be able to drain many other acres, amounting to near forty, by directing the cuts into it, which is a matter of much consequence, and shews the expediency of separating it from any drains in these accounts, but ranking it as one of itself.

EXPERIMENT, N<sup>o</sup> 3.

Having proceeded thus far in my undertaking, I cut a main drain 88½ perches long, which leads through the wettest parts of the field to the end of that

that registered in Experiment N<sup>o</sup> 1. It was a yard deep, four inches wide at bottom, and two feet at top, and the price of digging and filling 4*d.* per perch. It was filled up twelve inches deep with stones, at the rate of seven bushels per perch, then a layer of straw, and last the moulds.

But I should here remark a precaution which I found of use: every five or six perches I left a space of about a yard and half unfilled; this I did to be able to observe if the water ran freely off, that in case it hung any where I might cut other drains to convey it away: and in one place, at the distance of about fifty perches from the ten perch drain of Experiment N<sup>o</sup> 1. I found the water after a heavy rain ten inches deep in this drain, though it was clear at other places; I immediately was forced to mark another main drain fifteen perches long, to convey it round by a different slope; of which more hereafter.

EXPENCES.				£.	s.	d.
Digging 884 perches, at 4 <i>d.</i>	-	-	-	1	9	6
Stubbing 20 loads of stone at 1 <i>s.</i> 0 <i>d.</i>	-	-	-	1	0	10
Carting ditto,	-	-	-	0	3	0
Value of ditto,	-	-	-	0	10	0
Straw,	-	-	-	0	5	0
Horses and wear and tear,	-	-	-	0	3	9
Total,	-	-	-	3	12	1

Or 9*d.* per perch.

#### EXPERIMENT, N<sup>o</sup> 4.

The above-mentioned main drain of fifteen perches long being conducted upon a different plan, it is necessary to register it separately from the rest.

Before I had nearly half finished my undertaking, I found that my stone would fall short, I therefore determined to make an experiment of wood for a main drain, as well as for smaller ones. This was cut four feet deep in some places, four inches wide at bottom, and about twenty at top.

I had near this field a very large thorn hedge, of about nine years growth, all white thorn, without any mixture of other wood. This hedge I cut for the purpose of filling my drains, and made it into saleable bush faggots; and with some of these faggots filled the drain in question. The bushes were tied up at their full length, in the same manner as all bush faggots are in this country for the purpose of making dead hedges. In filling the drains, one faggot was laid in, and then a second, doubled in part one on another, so as the two filled just a perch; then the men trod them down gently, laid in straw as before, and filled up. I found this method to

answer perfectly well, for the water ran much freer through this main drain than the other that was filled with stone. The only doubt that is entertained of this bush filling is the duration of it: but I am credibly informed that there are many of these drains in Essex above thirty years old that run as well as at first.\*

## EXPENCES.

	£.	s.	d.
Digging and filling 15 perches, at 5 <i>d.</i>	0	6	3
Value of 40 faggots at the drain,† being a load,	0	7	0
Straw,	0	1	6
Total,	0	14	9

Or 11*½d.* per perch.

Let me here remark, that this drain flowed to the full as well, and in hasty rains even better than the stone ones, and gave no signs of decay, while I was on the farm.

EXPERIMENT, N<sup>o</sup> 5.

My next business in this little drainage was to cut the small drains; this I did in a variety of directions, through the wettest places, and generally within a perch and half of each other, the depth thirty-two inches. They were filled up in different ways, which renders it necessary to treat of each separately. Fifty perches were filled with stones, of which the account is as follows:

	£.	s.	d.
Digging and filling 50 perches at 3 <i>d.</i>	0	12	6
Carting 9 loads of stones,	0	1	9
Stubbing them at 1 <i>s.</i> 0 <i>¼d.</i>	0	9	4 <i>½</i>
Value of ditto,	0	4	6
Straw,	0	3	6
	1	11	7 <i>½</i>
Carting, horses, and wear and tear,	0	1	8 <i>½</i>
Total,	1	13	3 <i>½</i>

Or 7*¾d.* per perch.

This is not, I think, an extravagant price; but such an one as cannot fail of answering greatly.

\* Since this was written I have particularly noticed it on a farm I took in Essex, whereon are drains filled with bushes thirty-five years old, that run in great perfection: in some places the wood remained, in others was gone; but the earth arched over the stream.

† This is the price at which I could have had them delivered to any field about my farm.

EXPERIMENT, N<sup>o</sup> 6.

One hundred perches of these small drains were filled with wood, at the rate of two of the above-mentioned faggots to the perch ; but where they laid thin extra ones were thrown in. I should remark that these cuts being in the very flattest part of the whole field, I kept them open some time, in order to be convinced that the water would run freely off ; a frost (though a slight one) coming in the mean time, shattered down the sides of the drain so much that the extra labour of cleaning them out came to 7s. 6d.

EXPENCES.				£.	s.	d.
Digging and filling 100 perches at 3d.	-	-	-	1	5	0
250 faggots, at 7s. the load of 40,	-	-	-	2	3	9
Straw,	-	-	-	0	6	0
Total	-	-	-	3	14	9
Or 8½d. per perch.						
Add for cleaning,	-	-	-	0	7	6
Total	-	-	-	4	2	3
Or 9½d. per perch.						

I have calculated them separately, for the sake of comparing the stone and the wood drains, for as the cleaning belonged peculiarly to neither, but was accidental, it should not come into the comparison. The stone is 7½d. and the wood 8½d. but notwithstanding this difference, I give the preference (in this farm) to the latter, and for the following reasons.

Stone is so extremely scarce in this country, that it would be an immense expence, and infinitely troublesome, to get enough of it for draining a large field. The stones I used in this were raised in my own gravel pit ; and I should observe that in procuring them I paid the labourers for some hundred loads of gravel at a lower rate, though it was of a bad sort, and not much wanted. There is no getting stones upon other terms here ; which, added to the scarcity of them when got, renders wood, in my opinion, much more eligible. It has many advantages. You may have it in any quantity you please, and at a short warning—the carriage is easy, and the trouble of placing it in the drains so much less than stones, that the workmen would do the whole business cheaper if they knew before that nothing else would be used. Add to this, that good bushes, such as those I have used, are dearer by 2s. a load than common brush out of woods, consequently drains might be filled much cheaper with the latter : though I suppose it would rot away sooner than the other. For these reasons, I think there is no comparison be-

tween

tween the two methods at this place ; and consequently at all others circumstances the same.

The total of the above expences, *9½d. per perch*, is not high : it is, relative to the improvement, cheap ; nor should any farmer hesitate a moment at undertaking it, who occupies such land as I do.

### EXPERIMENT, N<sup>o</sup> 7.

Forty perches more were filled with the wood I just mentioned, called *brush*.

EXPENCES.				£.	s.	d.
Digging and filling 40 perches, at 3d.	-	-	-	0	10	0
2½ loads of brush,	-	-	-	0	12	6
Straw,	-	-	-	0	2	0
Total,	-	-	-	1	4	6

Or *7½d. per perch*.

### OBSERVATIONS ON these EXPERIMENTS.

It is necessary here to unite in one view these several trials, that the whole expence of the drainage may be seen.

	£.	s.	d.
10 perches, experiment N <sup>o</sup> 1.	1	9	5½
120 ditto, the great drain in experiment N <sup>o</sup> 2.	14	5	0
88 perches in N <sup>o</sup> 3.	3	12	1
15 in N <sup>o</sup> 4.	0	14	9
50 in N <sup>o</sup> 5.	1	13	3½
100 in N <sup>o</sup> 6.	4	2	3
40 in N <sup>o</sup> 7.	1	4	6
<u>423 Total,</u>	<u>27</u>	<u>1</u>	<u>4½</u>

Or *15. 3½d. per perch*.

If the great drain in N<sup>o</sup> 2. is extracted, the account will stand thus :

<u>303 perch,</u>	12	16	4½
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Or *10d. per perch*.

The latter is the state which most demands attention, because the great drain of N<sup>o</sup> 2. would, as I elsewhere remarked, answer for draining many acres, and I intend to use it for that purpose. This is also the account for all those

those fields that have a descent sufficient to carry off the water without extraordinary expence, or whose ditches are already deep enough without sinking.

These cuts completely drained six acres of land, and much benefitted two acres more: but I shall calculate for only six. £12. 16s. 4½d. so divided comes to 2l. 2s. 8½d. *per acre*; an expence which I must think very small in comparison of the vast utility by which they were attended.

This part of the field had always been famous for defeating the farmer's expectation in most crops; for the water rested on it so much, that all winter it usually was several inches deep over the ridges; consequently was very late in the spring e're it could be stirred, which is an extreme unfavourable circumstance. Wheat itself is generally much spoiled in it, for want of the deep as well as numerous water thoroughs which were every winter requisite to keep it dry; an expence which none of our farmers allow near so much as they ought. In a word, it was a most unprofitable piece of land. The reader, in another place, has seen how I lost a crop of summer-land barley in 1764 on it.

After the draining the difference in the tillage was extremely great. It broke up under the plough quite in a mellow crumbling state; very different from what I had at any time observed before. All my succeeding crops were great except the first of oats following the barley, and that was superior by acknowledgement of all who viewed them to any former second crop. Tares for hay followed, of which the crop was very fine; then wheat on a manuring, which, for the extreme unfavourableness of the season, was a great one, and made such an appearance in the straw and ear, before harvest, that every person who saw it calculated the product at five quarters *per acre*. The tenant who followed me sowed white oats on that wheat stubble, and had an extreme fine product. The draining therefore of this piece of land was so great an improvement, that it, literally speaking, converted a *very bad* into a *very good* field: without which, all the manuring that could have been spread on it would have signified but little; a fact well known to all the occupiers of this sort of land. Without draining, the whole value of the manure is washed out the first winter. Two guineas *per acre* for such an improvement is surely a cheap purchase.

The quantity of this sort of land in this neighbourhood is extremely great; all of it vastly improveable by this method of draining. To calculate the value at 8s. an acre is, I am persuaded, a low estimate; but according to that the gain of 3s. *per annum* for 42s. expenditure is above 20 *per cent.* profit. Those, however, who are acquainted with the unprofitableness of such wet soils, will allow that to lay them dry is much more than *doubling* the value.

The difference extends to every particular relative to the culture of land, and comes in play every year. If an early spring sowing is in question, such a soil



a soil will not admit it. It must not only be late sown, but the number of ploughings must be greater than on drier land: for having been soaked in wet it does not get dry enough to plough so soon as other lands, and breaking up in a tough faddened state must necessarily be more ploughed than other soils before it can be pulverized. Wheat suits it best, but even this grain cannot thrive in it without such numerous, deep and well cut water thoroughs, that the expence runs up very high; and is necessary for every crop. If a farmer has any other land, he will not venture any manure on these soils, and for good reason; they are so wet that the virtue of the manure is presently washed away; and even for the first crop, unless a spring one, the benefit is half lost. In the crops themselves the quality of both corn and straw is extremely bad. All these circumstances attend such flat, loose, clayey loams, as I am now treating of; and any considerate person, who reflects on the greatness of the objection to them, and how well they are founded, will readily allow that too little rent can scarcely be given for them. When they are all removed by laying the soil perfectly dry, there can be no doubt but it will be better worth 20s. an acre than 10s. before.

That there is no extravagance in this assertion will be assented to, if it is calculated how small a part of those objections operating every year, equals this increase of rent. Suppose we state some small parts of those objections operating every year, and compare them with the increase of rent.

F A L L O W.		£.	s.	d.
One ploughing extraordinary,	- - - - -	0	4	0
W H E A T.				
Extraordinary expence of water-furrowing,	- - - - -	0	0	9
The deficiency of the crop on account of the inability of ever manuring, cannot be estimated at less than	- - - - -	0	8	0
The deficiency arising from the wet that cannot be carried off by water thoroughs must be	- - - - -	0	5	0
Suppose the crop 16 bushels, the deficiency in price will be at least	- - - - -	0	4	0
That of straw and chaff,	- - - - -	0	1	0
A general deficiency from the general temper of the land that cannot be particularly arranged, I should estimate at, at least,	- - - - -	0	7	0
Total 17. 5s. which is but 5 bushels, at 5s. But myself as well as many neighbours know the increase of produce of this land on draining to be much more than this proportion.				
Carried over,	- - - - -	1	9	9

Brought

	£.	s.	d.
Brought over,	1	9	9

## B A R L E Y.

In this grain the difference between dry and wet land is prodigious ; that alone, on account of late sowing, is frequently the loss of a crop ; but I shall estimate it at 20s. only	1	0	0
The deficiency on the manuring account,	0	5	0
That from the general wetness,	0	4	0
Suppose the crop 18 bushels, the deficiency of price will be at least	0	3	0
That of straw and chaff,	0	2	0
Extra expence in water-furrows,	0	0	3
Total,	2	4	0

The third of this is 14s. 8d. *per annum*, which is the lowest that can be estimated by calculation ; but in addition to it should be remembered the circumstances that will not admit of calculation ; and in which consist the difference between the *chances* of good land and those of bad : any person who has occupied them must know that in a course of years the *failure* of crops is totally on the side of the latter ; and that in bad years such soils are sure to suffer far beyond the others : nor should it be forgotten that the expences of management are nearly the same on an acre that yields only *two* quarters as on one that yields *four*. All these considerations unite to prove that the calculation of 15s. *per acre* difference is a *very low* estimate.

The expence of covered drains, according to the preceding experiments, is 2l. 2s. *per acre*, or, in other words paid in less than three years by the increase only of 15s. *per annum*.

A farther motive for thinking this estimate much below the truth, is the experience I had in 1764, on the field drained in these experiments. It is a striking but not less true a fact, that had these six acres been drained in the winter of 1763, the whole expence would have been undoubtedly repaid by the single crop of barley of 1764 ; which shews that the advantage of the practice can scarcely be laid too high. It is a comparison of much the same nature as the contrast of *good* and *bad* land, upon which the farmers in this country have a very just proverb : *A man can hardly pay too much for good land, nor too little for bad.*

EXPERIMENT, N<sup>o</sup> 8.

The reader by turning to the list of the fields in which these experiments were made, will perceive that most of my pastures were extremely flat, and

wet, much like the generality of unimproved grass lands in this neighbourhood) the surface being a loose woodcock brick loam on a clay bottom. I never heard of any method of improving them equal to that of covered drains, which are so essentially necessary, that they must precede all other methods. It would be madness to think of manuring them, while in their wet state; as the manure, of whatever it consisted, would be floated away, and the land little the better for it. Manure that lies soaking in water, or on the surface of very wet land, cannot be of much service, it loses that heating fermenting quality which is its excellency.

The possession of several fields in this execrable state, made me determine to set vigorously about their improvement; but not to launch into great expences until I gained some experience of the method of making covered drains, of the expence, and of the effect. Whether the principle is right or wrong, a man who proceeds on it cannot do much the first years of his lease. The urgency of the case of field T. demanded my first attention, and accordingly those six acres were my business in 1764. In the winter of 1765 I began my pasture draining, and fixed upon field E. of about four acres, for my operations, designing to drain and manure one pasture every winter. In this year's work I tried different ways of executing it, which makes it necessary to divide the trials according to the mode of performing them. I should premise that I was lucky enough in this field to have a ditch at one corner, deep enough to carry off the water, so that I saved the expence of making one, which is always so heavy when an extraordinary depth is to be gained.

Ten perches, an outlet drain (to the above-named corner ditch) were sunk 4 feet deep, 10 inches wide at bottom, and 2 feet 6 inches at top, and filled with old thatching wood that had been wove into a fence, (called in this country a cock-hedge) the sticks all seven feet long, and nearly as large as my wrist; they answered this end excellently: filled the drain 18 inches deep with them. *N. B.* I made the men in laying them in, throw a large stone now and then among them, which kept them very hollow, with many cavities among them.

EXPENCES.				£.	s.	d.
Digging and filling 10 perches,	-	-	-	0	5	0
Straw,	-	-	-	0	1	0
Value of the wood,	-	-	-	0	4	0
Total,	-	-	-	0	10	0

Or 15. a perch.

This drain answered extremely well at all times, carrying the water off very speedily. I should remark that in pastures the men take but a shallow spit at first, which is the turf alone, for the purpose of laying it down again when the drain is filled.

EXPERIMENT, N<sup>o</sup> 9.

Fifty perches of the main drains were dug 36 inches deep, 4 inches wide at bottom, and 18 at top, and were filled with the same hedge wood as the preceding experiment.

EXPENCES.				£.	s.	d.
Digging and filling 50 perches at 3½d.	-	-	-	0	14	7
Value of the wood,	-	-	-	0	9	0
Straw,	-	-	-	0	2	6
Total,	-	-	-	1	6	1

Or 6½d. per perch.

This drain, like the former, ran always extremely well, and answered my expectation fully.

EXPERIMENT, N<sup>o</sup> 10.

Ten perches of this main draining were filled with stone picked off the fields, at the expence of 8d. per load of twelve bushels. Depth, &c. the same.

EXPENCES.				£.	s.	d.
Digging and filling 10 perches at 3½d.	-	-	-	0	2	11
Straw,	-	-	-	0	0	3
50 bushels of stones at 8d.	-	-	-	0	3	4½
Carting ditto,	-	-	-	0	0	6
Horses and wear and tear,	-	-	-	0	0	7½
				0	7	8

Or 9d. per pole.

This drain likewise answered very well; but it is observable that all stone ones run slower than those of wood, unless the stones be large. Scarcely any of mine were so large as my first.

EXPERIMENT, N<sup>o</sup> 11.

Forty perches of small drains, 30 inches deep, 4 wide at bottom, and 16 at top, were filled with stones, picked as the others.

EXPENCES.				£.	s.	d.
Digging and filling 40 perches at 3 <i>d.</i>	-	-	-	0	10	0
Picking 150 bushels of stones at 8 <i>d.</i>	-	-	-	0	8	3
Straw,	-	-	-	0	2	6
Carting,	-	-	-	0	3	0
Horses and wear and tear,	-	-	-	0	3	1½
Total,	-	-	-	1	6	10½

Or 8*d.* per perch.

EXPERIMENT, N<sup>o</sup> 12.

Forty perches of these small drains were filled with pollard wood, the croppings of some oak trees in the field of about nine years growth.

EXPENCES.				£.	s.	d.
Digging and filling at 3 <i>d.</i>	-	-	-	0	10	0
Value, &c. of the wood, 40 faggots at 18 <i>s.</i> the load of 120,	-	-	-	0	6	0
Straw,	-	-	-	0	2	6
Total,	-	-	-	0	18	6

Or 5½*d.* per perch.

These drains have answered to the full as well as any in the field: and I should observe that this method of filling them by cropping the trees nearest, which saves all expence of carriage, is extremely expedient. I conceive from the size of the wood that it must last a long time, and the water runs very freely through it. The cheapness of it is striking; 5½*d.* per perch is a very low price; and the convenience of cutting down the wood, and at once filling up the drains is very great, and renders the business very compendious.

EXPERIMENT, N<sup>o</sup> 13.

Thirty perches I tried for the sake of observing the effect; dug no deeper than 25 inches, the breadth at bottom 4 inches, and at top no wider than the

the men to work. They were filled with the croppings of trees, and took at the rate of two faggots to three perches.

EXPENCES.		<i>l.</i>	<i>s.</i>	<i>d.</i>
Digging and filling 30 perches at $2\frac{1}{2}d.$	-	0	0	3
20 faggots at 18s.	-	0	3	0
Straw,	-	0	1	3
Total,	-	0	10	6

Or  $4\frac{1}{2}d.$  per perch.

The result of this trial is very important. The expence is so greatly reduced, that if the method answers, there could be no doubt of the great expediency of making the smaller drains no deeper than this measure. And this trial has proved it; for I have observed particularly that the part of the field through which this drain was cut, has continued equally dry and found with the rest. From hence I suppose that the effect of draining lies chiefly in the upper stratum of the earth, that is the loam which covers the clay; and if the drains are just below the loam, they command the minute courses of the water, which perhaps do not penetrate the clay. This is very consistent with the effect of the drain in question; but if very long ones of four score or an hundred perches were made, I apprehend it would be necessary to cut them larger, on account of providing a course large enough to carry off the proportioned increase of water; for which reason the main drains should be cut much deeper, although it be acknowledged that the water does not penetrate the clay, because there should be a descent from the separation between the loam and clay, into the drain that is cut through the latter; otherwise the water would not flow off with sufficient quickness. It is farther to be remarked, that this reduction of the depth of the drains can in arable lands be carried no farther than the depth of tillage in furrows; for the wood in the drains should undoubtedly be so low, as never to be in any danger of being touched by the plough, even in arching up ridges, when the furrows are sunk very deep: nor should there be prevention of trench-ploughing land, which in many cases is a very adviseable practice.

#### EXPERIMENT, N<sup>o</sup> 14.

Thirty perches more of the cross drains I marked out for a further trial of depth: they were only 20 inches deep, 4 wide at bottom, and at top of the proper breadth for the men to stand at their work. They were filled with croppings, taking two faggots to three perches as before.

EXPENCES.

EXPENCES.				£.	s.	d.
Digging and filling 30 perches at 2d.	-	-	-	0	5	0
20 faggots at 18s.	-	-	-	0	3	0
Straw,	-	-	-	0	1	3
Total,	-	-	-	0	9	3

Or  $3\frac{1}{4}d.$  per perch.

This drain answered perfectly well, and laid the land I think as dry as the deeper ones. The reduction of expence is very considerable; infomuch that in the pastures which I hereafter drain, I shall certainly cut the cross drains of this sort, making them however shorter than if they were deeper.

#### OBSERVATIONS on these EXPERIMENTS.

I shall draw my trials in this field into one view, as I did in the arable one; that the average expence may be found.

Perches.		Expence.		£.	s.	d.
10.	Experiment, N <sup>o</sup> 8.	An outlet drain filled with wood,		0	10	0
50.	_____ 9.	A main drain filled with wood,		1	6	1
10.	_____ 10.	A main drain filled with stones,		0	7	8
40.	_____ 11.	Filled with stones a small drain,		1	6	10½
40.	_____ 12.	A small drain filled with the tops of pollard trees,	}	0	18	6
30.	_____ 13.	A small drain (25 inches) filled with the same wood,		0	10	6
30.	_____ 14.	A small drain (20 inches) filled with the same wood,		0	9	3
210		Total,	- - -	5	8	10½

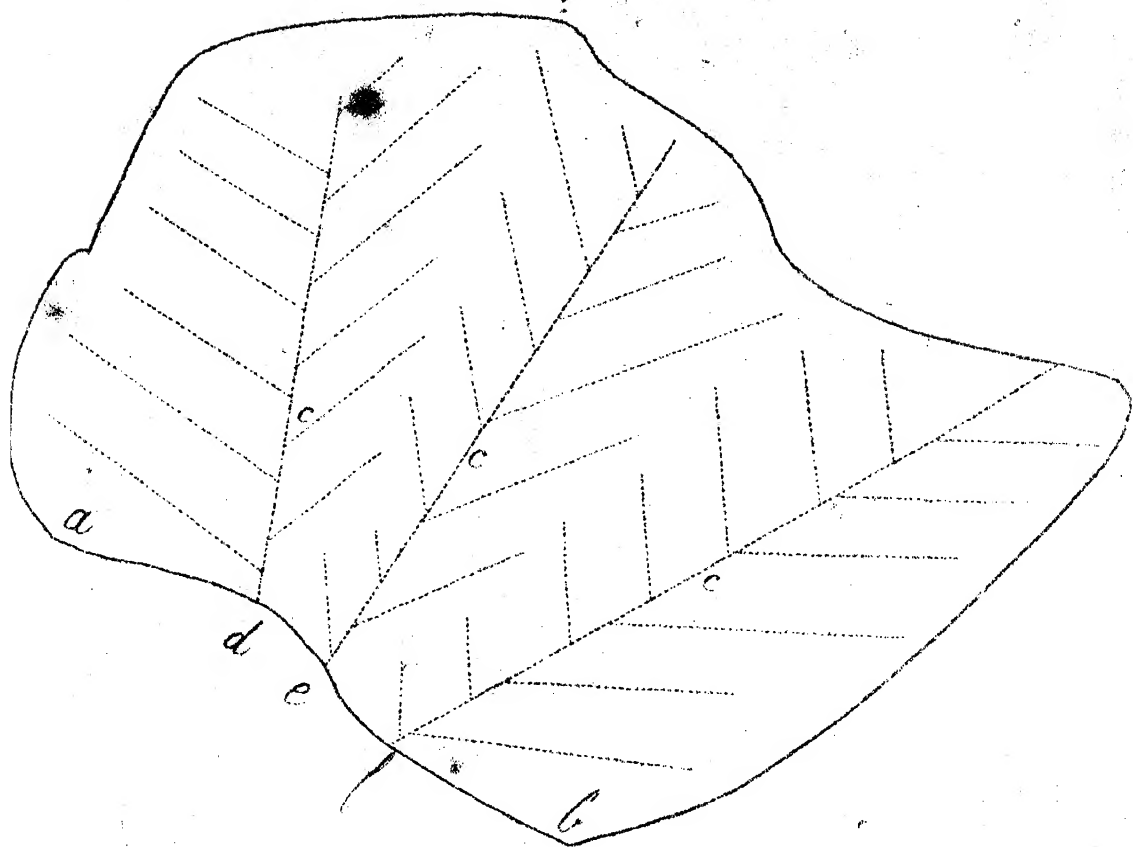
Or  $6\frac{1}{4}d.$  per perch.

	£.	s.	d.
Three acres and a half drained by this sum, is per acre,	1	11	0

As to the profit of this work, it has been so very great that an estimate of its exact worth cannot easily be made; and what renders it the more difficult was my manuring the field as soon as drained from a compost hill of farm yard and town manure mixed with turf and ditch stuff. It has ever since continued, without further expence, as excellent a pasture as any in the estate; seldom







feldom yielding less than from 35 cwt. to 2 tons *per* acre of dry hay, and very well worth a guinea an acre rent, though every person who had seen it agreed, that before this improvement it was dear at 10s. Before the draining it was over-run with rushes; the grass was all of a blue, sickly colour, and very small in quantity. Throughout winter, and in all wet weather, the water arose under the tread; the value of such a pasture any person can easily conceive not to be greater than I stated it; but the very contraries were exactly the case afterwards. No field could carry a better colour; all the rushes, moss, and other trumpery disappeared; and so far from the morass state in which the surface before was, that it would ever since bear even winter feeding without poaching. Much, in the richness of the product, is certainly to be attributed to the manure; but then it should be considered that without the draining, the manure could not have been applied, at least without excess of folly: whereas the draining without the manure would have undoubtedly effected a great improvement. But neither should receive praise exclusive of the other, as it is ever adviseable to manure these lands that have so long been soaked, and saddened with water.

The improvement of grass from 10s. to 20s. an acre, is an object highly worthy of the attention of every farmer who possesses such soils. He may be assured that he cannot in any way lay out his money for better interest; for the expence is so small in comparison of the profit (as has been particularly shewn under the article Grass Lands) that no one can doubt the greatness of the advantage.

Before I conclude the present part of my undertaking, I shall venture a slight calculation to shew the *general* expediency of draining by covered drains, and take my data from the preceding experiments both of grass and arable. When I speak of *calculation* I would always have the reader on his guard not to give the same assent to matters of opinion as to matters of experiment: the latter I *assert* were so and so: but the former are submitted to the reader for his *opinion*, not his conviction: he is at full liberty to accept or reject them.

Suppose a field of 50 acres of the form annexed.

From *a* to *b* I suppose a river, or a ditch, deep enough to carry off all the water that can come into it. The reader will observe that I have sketched three main drains, and laid several smaller ones into them. Such a figure as this to represent 50 acres, the field will be about 125 perches long and 64 broad, consequently the drain *d* may be called 40 perches long; *e* 50; and *f* 60. As far as *c* in each of these, I suppose them to be dug of the dimensions of experiment N<sup>o</sup> 8. the outlet drain; that is 4 feet deep, 10 inches wide at bottom, and 2 feet 6 inches at top, and executed at the expence of N<sup>o</sup> 8. The outlet of *d* will therefore be 13 perches long; of *e* 20 perches, and of *f* 30: in all 63 perches.

From the ends of these outlets to those of the whole drain, I suppose dug as in experiment N<sup>o</sup> 3, that is, a yard deep, 4 inches wide at bottom and 2 feet

at top; *d* to be executed in the same manner and expence as N<sup>o</sup> 3; *e* as N<sup>o</sup> 11; and *f* as N<sup>o</sup> 9.

The short drains of *d* to be done as experiment N<sup>o</sup> 13, that is 25 inches deep; and those of *e* and *f* as N<sup>o</sup> 14, which are 20 inches deep.

By this method of varying them, most of the different methods of digging and filling will be taken, and consequently the calculation the more applicable to different places.

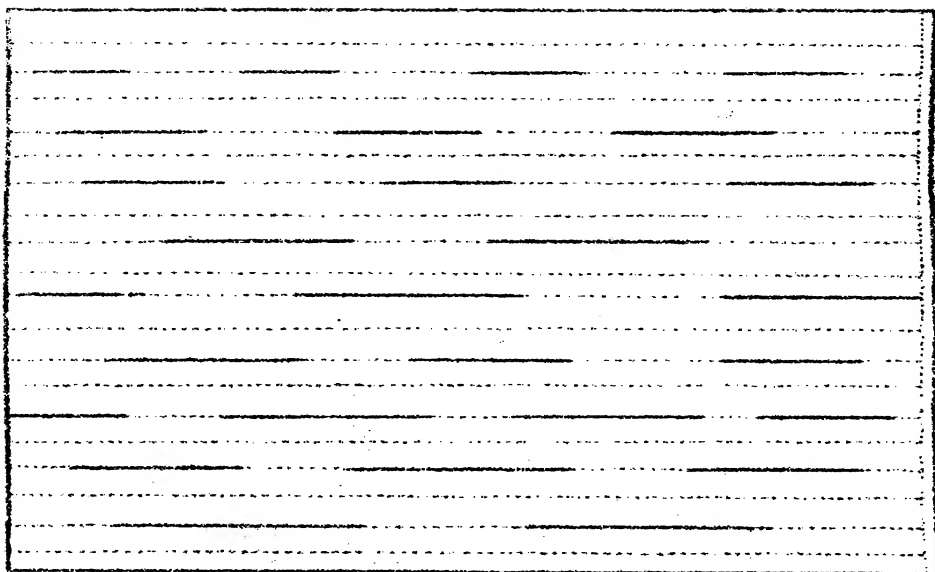
EXPENCES.		£.	s.	d.
63 perches, 4 feet deep, 10 inches wide at bottom; and 2 feet 6 inches at top, at 1s.		3	3	0
27 perches of <i>d</i> , 3 feet deep, 4 inches wide at bottom; and 2 feet at top, at 9½ <i>d</i> .		1	1	11
30 perches of <i>e</i> , 30 inches deep 4 wide at bottom; and 16 inches at top, at 8 <i>d</i> .		1	0	0
30 perches of <i>f</i> , 3 feet deep, 4 inches wide at bottom, and 18 at top, at 6½ <i>d</i> .		0	15	4
160 perches small drains of <i>d</i> , 25 inches deep and 4 wide at bottom, at 4½ <i>d</i> .		3	0	0
300 perches of ditto, 20 inches deep, and 4 wide at bottom, at 3½ <i>d</i> .		4	13	0
610 Total,		13	14	3

Or 5*l*. 5*d*. *per* acre.

Now I have often seen fields that would be well drained with this quantity, the expence not more than a single ploughing in many places. But if the number of drains be doubled it is 10*l*. 10*d*. *per* acre; if trebled only 16*l*. 3*d*. if four times the number are cut, it amounts to no more than 1*l*. 1*s*. 8*d*. Now surely nothing can display in a clearer manner the vast profit of this draining: but thus much I will venture to assert; that, upon such soils as I have already mentioned, I would drain at 1*l*. 1*s*. 8*d*. *per* acre expence, were my lease only to last three years; and those who are experienced in the husbandry of wet soils will agree to the prudence of it. How much more profitable must it therefore be when a farmer has a lease of from 7 to 21 years!

The annexed figures will assist in calculating the expence of these undertakings.

This represents an acre, each side of which may be called 13 perches. is drained by cuts, a perch and a half from each other, marked — — — frequently there are 117 perches. This number at 3½*d*. comes to 1*l*. 17*s*. 4*d*. Very flat and exceeding wet land would require so many drains, and yet total expence is thus low! lower than that of one common manuring! an absolute bog it might be requisite to cut them only three-quarters a





perch from each other, in which case the dotted lines . . . . . as well as the others would be drains, and the expence *3l. 14s. 9½d. per acre.* There can be no doubt of this expence answering greatly ; though I should apprehend not one bog in an hundred would require the drains to be cut so close.

The reader will, upon the whole, allow that the improvement by covered drains is extremely great , that it extends even to the rendering bad land very good ; that the expence of the work is so very small as to bear no proportion to the benefit of the improvement ; infomuch that it comes within the power not only of little farmers, but even of short leases.

## C H A P. II.

## Of O P E N D R A I N S.

THESE sorts of drains are peculiar to grass land: in arable land we call them water-thoroughs.

They have been in use, I apprehend, many ages; and doubtless were the origin of covered drains. At present they are used by such husbandmen as do not chuse the expence of the covered ones, which are somewhat more costly. The common method of making these drains is digging a trench a spit deep, and a spit and a half wide; the price of which is a halfpenny a pole. They are of great benefit to wet pastures, as I have more than once found; but then they must be very numerous: and a great objection to them is the necessity of renewing them every four or five years; for the natural weight of the land, with the treading of cattle, fill them up in that time so much, that they must be what is called *scowered* in this country; that is, cleansed. This expence, by repetition, will not be many years before it equals that of covered drains; but the benefit of them, though extremely great, is not equal, from a want of depth: for in digging, the workmen do not govern themselves by cutting below the upper stratum of the soil, but by the length of their spades, which sometimes are not above seven inches long. This is a strong reason for preferring the covered ones in the degree of benefit.

But besides these circumstances, there is another, which should by no means be forgotten, which is the loss of land: if many of these drains are cut, the quantity they occupy is not trifling; and in a course of years amounts to a considerable object.

I before mentioned that I had tried the use of these open drains: I have spent many pounds in them; but I shall not from thence think it requisite to insert experiments on this practice. That of covered drains I have found so vastly superior that they have always had the first place in my attention, and when once I had fully experienced their excellency, it would have been ridiculous

cule itself to have preferred the open ones. I began with the latter, but dropt the custom under the conviction of the covered ones, far, very far exceeding them.

But having thus expressed myself, I shall remark, that if farmers are so blind to their interests, or so wedded to old customs, as to determine never to admit a new one, then open drains should undoubtedly be practised; for a partial improvement is undoubtedly better than none at all. And if a landlord has a tenant that will not be persuaded to do the one, he should by all means urge him to practise the other.



## C H A P. III.

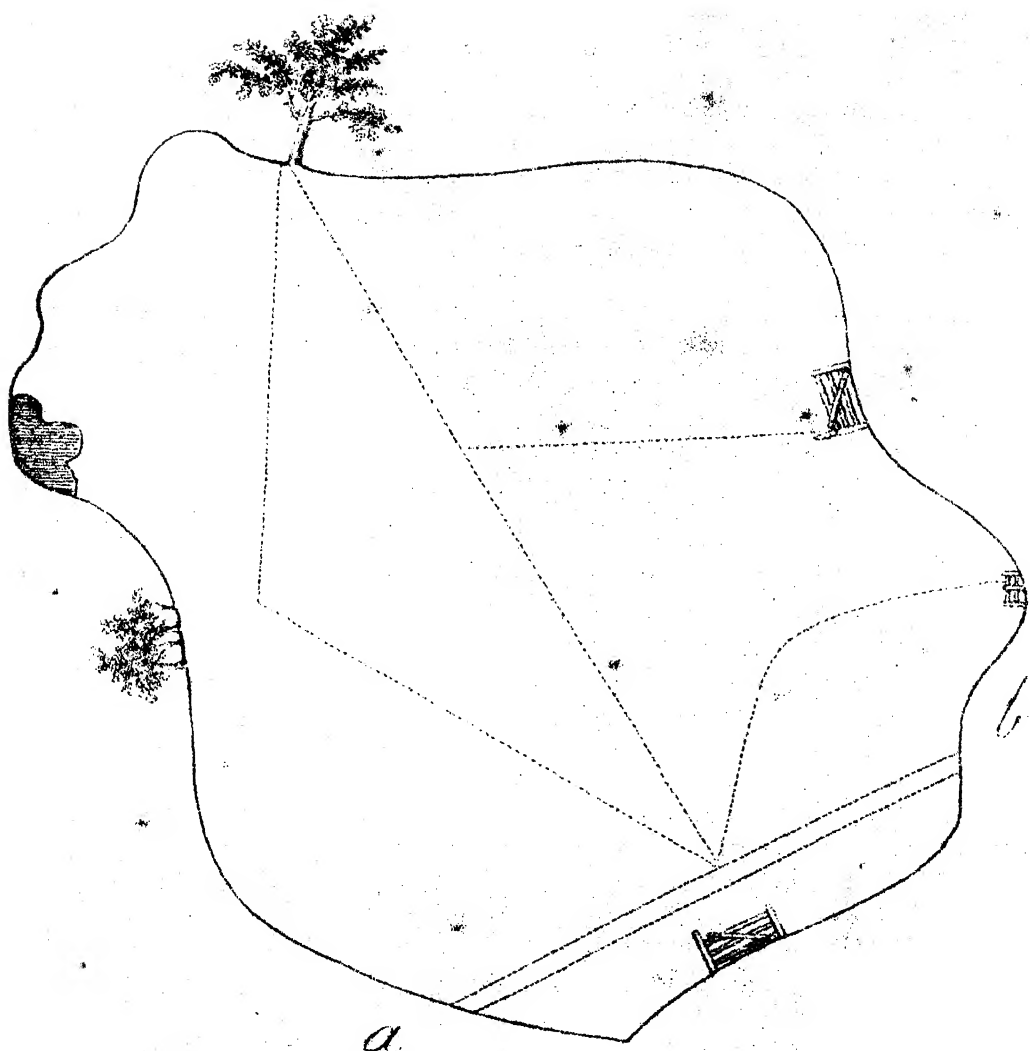
## OF WATER-THOROUGHES.

**T**HIS is one of the most important parts of husbandry ; for water-thoroughs are requisite even in fields that are ever so much drained by covered ones ; not from any defect in the latter but to remedy the evils of heavy rains that flow the land too quick for the water to sink away. This important business is too much neglected by common farmers ; for it is not uncommon thing to find half their winter corn, in a wet season, quite flowered in the lower parts of their fields with that water which might easily be carried off by means of water-thoroughs. Even those men who never cut a covered drain are very neglectful of this necessary part of husbandry.

When I came first to this farm I examined all my fields with the utmost attention ; and among other circumstances, remarked the small descents that carried the water off from some of them. Farmers always draw some water-furrows with the plough on new sown land ; and in this work they generally follow their predecessor's practice, whether good or bad. Thus in whatever field you go, you will be sure to find water-furrows marked in the same places you observed them in forty years before, though perhaps half an acre in each is spoiled by that which is stagnant. I found this the case in my own. My bailey, according to custom, in the autumn-ploughed fields, had ordered the ploughmen to draw the furrows without specifying *where* ; and in the winter I found many parts of my fields half under water. This determined me no longer to depend upon *general* practices, but to direct the operation myself for the future.

Accordingly I gave orders that none of my men should for the future draw out any water-furrows but such as I marked myself. When a field was ploughed, and ready for water-furrowing, I marked them out with sticks about two feet long, slit at one end, and a small piece of paper in them ; stick





dig through all the low parts of the field, and particularly through such as were imperceptible, without a more than ordinary attention. This attention had never before been given, and I found the good effect of it extremely visible, for my wheat crops, and fallows ploughed up in autumn laid in a very different manner from my neighbours. My first operation, however did not always fully answer; but then I constantly watched the land during winter, and if the water hung any where, marked new cuts, which were dug from the beginning by men with spades. Never leaving the field till I had absolutely and unexceptionably laid it perfectly dry. But without some memorandum farther than mere memory, the tracks of these thoroughgs would be forgotten from year to year, and all the trouble be annual: to remedy this inconvenience I sketched them on paper, in the manner annexed, which I would particularly recommend to all farmers who would render a neat and accurate husbandry consistent with simplicity.

Such a minute as this is fully sufficient to trace the water-thoroughgs with great accuracy and equal ease. Across from *a* to *b* is a swamp, which requires double furrows for the water to fall to on either side. From the bottom gate to the timber tree at the upper end of the field, one is marked. A winding swamp extends from the same gate to the same tree, the furrow through which is marked by ploughing in a line to the pond, till over-against the little grove of trees, and then to turn off full to the tree. Another low part of the field extends from the other gate some distance into the field; the furrow through it is marked by ploughing in a line to the pond until it intersects the first drawn thorough. Lastly, a winding one is requisite from the lower gate to the stile, the rule of which is to take the direction of the other gate till almost over-against the stile, and then to turn to it. This has been my practice constantly, and it has always proved of very considerable use to me: as fast as wet weather rendered a thorough necessary I made it, and immediately traced it as above on paper. There is never any want of objects for one's direction; gates, stiles, ponds, corners of fields, trees, bushes, &c.

A particular attention is absolutely requisite to water-furrowing, even if the field is hollow drained, though the number of the cuts need not be so great. Very heavy and hasty rains cannot be carried off sufficiently quick, especially from swamps, without water-furrows. Consequently it demands no slight attention to see that the few, then necessary to be drawn, be exactly in those places best adapted to the use.

Respecting the dimensions of these water-furrows, many farmers only plough them: the ploughman sets up a small white stick at one end of the field, and ploughs to it from the other, leaving a furrow as strait as a gardner could lay his line. But this operation, though ever so neatly performed, makes a very indifferent water-furrow for want of depth. There are two additions to it, one is the shoveling out the loose moulds, and opening the furrows

furrows of the land for the water to run out ; the other is digging a spit deep after the plough, and then shovelling out the moulds. The latter has been every where my practice, and with a particular eye to the depth in my undrained fields. The prices of these works are 3*d.* a score perches for the shovelling, and 5*d.* for the digging after the plough ; and in case it is dug without any ploughing, 10*d.* a score. But where labour is in general dearer, these prices would of course be higher. My expence on flat wet wheat fields has been sometimes very high ; but the farmer may be assured that no money he can lay out (especially in those fields that are not laid dry by covered drains) will pay him better. It is for want of them that we so often see the lower parts of fields, and even of corn, under water, to its utter ruin.

The reader finds that I have under this head delivered no direct experiments : I think it is a subject which is better treated *in general* but *from experience*.

Some points in husbandry are of this nature ; wherein experiment must give way to observation founded on experiment. I had under this head registered several trials ; but on revision I thought they would have too much the appearance of useless divisions.

EXPERIMENTAL  
AGRICULTURE.  
BOOK XI.  
OF FENCES.



## B O O K XI.

## O F F E N C E S.

**T**HIS book requires no division, for the only fences of which I have experience are the union of hedges and ditches: we seldom use them separate, consequently they cannot be separated with any propriety here. This being a point in husbandry of very great importance, I shall venture the insertion of my detached experiments, and make such remarks on them as the subject demands.

I shall previously observe, that the fences of this country are ditches from 3 to 4 feet deep, 3 or 4 feet wide at top, with hedges of live wood. When they repair a fence, they cut up all the wood close to the bank; then cleanse the ditch, throwing the rich black part of the contents on the brow of the field, and the clay or loam on to the bank to face it, fill up inequalities, and heighten it if too low. Then out of the wood they cut hedge stakes, about a yard, or 2 feet 6 inches long, which they drive down in a line on the top of the bank till fast. Between these stakes they interlace the thorns; and in want of them, any of the common wood; concluding the top of the hedge with what they call *edders*, that is twisting hazels, or any pliable sticks of some length between the stakes, and with one another by way of finishing the top of the hedge.

But of late years they have got into a more compendious method of making their hedges, which is to dig a slight trench along the top of the bank, and in that to set the bushes and thorns, cut about two feet long, pretty thickly inclining towards, or rather *over* the ditch, and fill it again with the earth, treading it in to keep the wood fast. This is a most slovenly practice, and has been introduced merely for its cheapness, without any other consideration.



EXPERIMENT, N<sup>o</sup> 1.

In the winter of 1763 cleansed an old ditch, 12 poles long, contiguous to my farm yards, and finding the soil a good clay, my bailiff advised me to make a large ditch, not only as a fence, but also for the sake of the clay being near the yard for mixing dung with it. I agreed with the men to give them 2½*d.* *per* load of 30 bushels for all the stuff thrown out, to have it carted away directly. The ditch was 6 feet broad at top, 5 feet deep, and 2 feet wide at bottom and the expence *per* perch, by this agreement, came to 2*s.* 6*d.* The labourers not being skilful at this work, they made the slope of the banks so irregular, that afterwards I was much troubled with cleaning after the falling in of the banks.

This is a circumstance not sufficiently attended to in the cutting of ditches. It is a matter of great consequence to have the banks properly sloped, and at the same time regular; it saves much trouble and expence afterwards in *remedying* an evil, that might at first have been easily *prevented*.

Another remark I should make on this experiment, is on the mode of agreeing with the labourers: I do not approve of this method by the load, because they are apt to dig the ditches of a greater breadth than agreed; and not to be mindful of sloping the banks properly: they dig direct perpendicular spits for the sake of riddance; and will never leave a handsome well cut ditch. An agreement by the perch is therefore preferable.

EXPERIMENT, N<sup>o</sup> 2.

In the winter of 1764 enlarged one of the ditches of fields U. and T. 30 perches long: it had been cleansed out and the hedge cut but a few years before, by the preceding tenant; but being a poor weak *set* hedge (that is one of those made without hedge stakes, which I before condemned in describing the common practice) I found it necessary to enlarge the ditch, to render the fence sufficient to answer its purpose. I cut it to the size of 5 feet broad at top, 4 feet deep, and 18 inches wide at bottom, the expence 1*s.* a perch.

EXPERIMENT, N<sup>o</sup> 3.

The same winter repaired a hedge and ditch, 25 perches long, against field B. The hedge was old, and the ditch so large that it required nothing but cleansing: the rotten leaves and stuff, that seemed good manure, were shovelled out, and laid on the brow of the adjoining field; and then one spit dug at the bottom of the ditch, with which the bank was mended. The old hedge was cut, and a *set* one made, for all which I paid 4½*d.* *per* perch,

perch, besides paying for the spare wood being made into faggots. I also allowed, according to the custom of some farmers, 2*d.* in every shilling, in lieu of the labourers taking a part, which is here called a *bear-home*; the custom is a large faggot of wood to every perch.

Upon this trial I must observe first that these *set* hedges are execrable. This fence was made in December; and reviewing it in April, three fourths of it was destroyed, the ditch remaining the only fence; wind and snow broke it into the ditch, and the poor people found no difficulty in bundling up the rest and carrying it off. I am determined never to have any thing more to do with them.

Secondly, let me observe, that in the article of the labourers allowance-wood, the farmer, particularly a *gentleman* one, is wretchedly imposed upon. Many stubs are ruined, and banks destroyed, because roots appertain to the labourer, the best of the wood is frequently tied into the middle of the refuse, and then all carried off under the title of *scruff and stuff*. Not allowing a stick to be moved is very adviseable; but directing them to tie up a faggot to every perch, and when the ditch is finished to view them; if they are fairly made, cart them home to the man's house; if not, take them yourself, and pay him 2*d.* in the shilling of his job in lieu. This method saves many flagrant impositions.

#### EXPERIMENT, N<sup>o</sup> 4.

In the winter of 1765, repaired a hedge and ditch 35 perches long, against field E. it had not been done for many years, so that the ditch was filled with rubbish. I agreed with the men to dig it 4 feet wide at top, 3 feet deep, and 18 inches wide at bottom, for 10*d.* *per* pole, including the making a stake and edder hedge. I had a large quantity of excellent manure out of this ditch, consisting of rotten wood, leaves, &c. &c. &c.

But in this experiment I found that our stake and edder hedges are little more to be depended on than the *set* ones. This, it is true, lasted through the winter in which it was made, and also the following summer; but the succeeding winter almost ruined it: the weight of snow, and the force of winds broke it presently in pieces, and yet this hedge was well made. I do not perfectly understand the writers who have treated on *plashing* of hedges; but any thing must be superior to ours, which consist totally of dead wood, for two or three years after cutting, until the green hedge gets up. The weakness of them is surprising, for all the wood being dead, the stakes rot in the ground, and then a small force breaks them off, and the wood falls into the ditch with the first snow. Now in the *plashing* method I apprehend the hedge stakes are left alive, and the large wood bent down to weave into the hedge; this method must be infinitely superior to the common way in this neighbourhood.

I have conversed on this subject with some ingenious farmers in this neighbourhood, and with my bailiff; they all condemn my ideas, and insist that no improvements can be made in their methods. I urged them to give me their reasons, but on this head they were silent. I asked my workmen concerning it, but none of them could be beat out of their old ways. Now, having no experience of the husbandry of plashing, I cannot speak decisively, nor venture to assert that it really is superior to our own; but as far as reason can be my guide, I am perfectly clear that it must. But not having the means of trying it, must be content with our own country method, however faulty.

#### EXPERIMENT, N<sup>o</sup> 5.

In the same winter I repaired 30 perches of hedging and ditching between fields S. and T. The men agreed to cut the old hedge, make a new stake and edder one, and shovel out the ditch for 6*d.* *per* perch, and they performed it very well. I also paid them 2*d.* in the shilling, according to my usual practice, instead of their taking any wood. But notwithstanding the men performing their work very fairly, yet this hedge, like all the others in the country, did not last two years in any degree of strength. This I have found is the universal fate of hedges made after the Suffolk manner.

#### EXPERIMENT, N<sup>o</sup> 6.

The same winter repaired the fence between P. and F. The ditch was a tolerable good one, so it required nothing but shovelling; the old hedge was cut, and a *set* one made. This I submitted to from not having a sufficiency of the proper wood for a stake and edder one. The price 3½*d.* *per* perch: the men who executed this work making their own faggots pretty fairly, I let them have them instead of paying them the additional sixth.

#### EXPERIMENT, N<sup>o</sup> 7.

In December 1765, cut a new ditch 11 perches long. Made it 4 feet wide at top, 3 feet deep, and 1 wide at bottom: raised a bank with all the earth that came out of it, planting half a hundred white thorn sets in each perch. On the top of the bank made a new dead hedge with bushes, stakes and edders.

#### EXPENCES,

	£.	s.	d.
Digging the ditch, making the hedge, &c. at 1 <i>s.</i> 6 <i>d.</i>	0	16	6
550 white thorn sets at 1 <i>s.</i>	0	5	6
Facing the bank on the side contrary to the ditch,	0	1	0
Carried over,	1	3	0
			Brought

	£.	s.	d.
Brought over,	1	3	0
A load and three quarters of bushes at 7s.	0	12	3
100 edders,	0	2	8
100 flakes,	0	2	8
Total,	2	0	7

Or 3s. 8½d. per perch.

This experiment is of importance, for it is an object much worthy of attention to discover the expence of every part of husbandry, and particularly of all new improvements. Now in the inclosure of open countries by hedges and ditches, the work can only be done by such fences as this delineated in the present experiment: discovering the expence under different data, is certainly of great consequence to calculate the cost and profit of new improvements. But as I have made, and shall in future make, many other trials of this sort, I shall desist at present from calculating the expence of inclosing a given number of acres, according to the practice laid down in these experiments. In addition to this trial, I shall remark, that in the winter of 1767 this hedge wanted some small repairs; and from my viewing it then I judged that it would require being new made in two years more, taking some more repairs in the mean time.

#### EXPERIMENT, N<sup>o</sup> 8.

At the same time with the preceding experiment, I made another new fence, 11 perches long. The ditch 3 feet wide at top, 2 feet deep, and 1 foot wide at bottom. The hedge the same as that of N<sup>o</sup> 7. But this was done for 1s. a perch.

	£.	s.	d.
EXPENCES.			
Digging the ditch, and making the hedge at 1s.	0	11	0
550 white thorn at 1s.	0	5	6
Facing the bank,	0	1	0
A load and three quarters of bushes at 7s. (40 faggots the load)	0	12	3
100 edders,	0	2	8
100 flakes,	0	2	8
Total,	1	15	1

Or 3s. 24d. per perch.

Several of the articles of expence in this account and that of the last experiment require some explanation.

The white thorn plants are collected by the labourers about the country wherever they can find them, particularly straggling ones that over-run pastures; they are so plentiful, that I believe they are always to be had in any quantity requisite for an inclosed country; but I need not remark, that for new inclosures in an open country, nurseries of them should be sown, by which means they will also come much cheaper.

The facing the bank is this: when the earth is thrown out of the ditch it is laid along one side of it to form the bank, but this somewhat irregularly done; for when it is finished, many of the clods and moulds fall too far, and irregularly: after the work is finished, therefore, and the hedge made, the men face up the back part of the bank, that is, bank up these moulds regularly to the bottom of the hedge. Not being included in the agreement, the men undertook it for a shilling in the great.

The bushes I bought from a neighbour's wood: a load is forty faggots; they are made of the full length of the bushes, and cut from ten to fifteen years growth, but their body is small. The stakes and edders are bought at the same time; but I should remark, that the former are generally very paltry: they ought to be remarkably strong, but the sellers give no attention of that sort to them.

The method used here of laying the quick into the ground is this: the fellows set their line, and dig one spit of turfs along it, if on grass land, or of earth if arable; this they turn as neatly as they can over the line, for the beginning of their bank, and lay the quick upon it, the roots from the ditch, and the other end (they cut them into lengths from six inches to a foot) projecting about three inches from the bank. This first spit they call their *pillow*: the next they lay carefully on to it, burying the quick, so that the bed of the plants is about nine or ten inches above the level of the field. After this, the rest of the earth is laid in the same manner above it, only attending to preserve the slope of the bank regular, and on the top of it the dead hedge is made.

It is obvious that in this method the fence is completed as soon as made, and is impenetrable to man or beast, as long as kept in repair; the quicks are also totally preserved from the attacks of cattle, by the hedge on one side, and the ditch on the other, and by the points of the hedge-wood projecting over it. Now I have read much of a clause in the acts of parliament for new inclosures, to prevent sheep being turned into them of nine years: the meaning of this is to preserve the quick; but in what manner do they inclose? Do they plant the quick upon a level, and leave it exposed on both sides? Or do they neglect the making of ditches? If a country was to be newly inclosed in the manner I have specified here, sheep might be immediately admitted with total impunity. I have never seen any damage result from them to new fences, when the ditches are of a sufficient breadth and depth; that is five feet broad  
by

by four deep, in wet countries, and four feet by three in dry ones. The grand objection to our fences is the weakness of our dead hedges ; but while they are preserved nothing can injure the quick.

EXPERIMENT, N<sup>o</sup> 9.

In January 1766, repaired a hedge and ditch 29 perches long, between A. and E. The ditch was but an indifferent one ; the labourers took it to enlarge to the dimensions of four feet wide, and three feet deep, and to make a stake and edder hedge out of the old stuff at 9*d.* *per* perch.

This hedge no more than nine tenths of what I have seen, lasted, as it ought ; it wanted many reparations in two years from the hedge-stakes rotting in the ground.

Another expence relative to this fence I must remark, which was some paling at one place where the hedge was insufficient. The ditch changes its course, being in one part against A, and in another against E. The common method of remedying this defect is to stuff a bundle of bushes into the opening in the bank, and drive a stake through them : but having often remarked that with the best attention to fences in general, they were frequently rendered useless by leaving these places in such a slovenly manner, and particularly from sheep and hogs getting into the ditch on one side, and passing the opening, rise in the other field, I determined to apply a remedy better than the common one. With this view I made the carpenter build a paling across the gap, the upper rail being level with the top of the hedge, and the whole contracted at bottom to fit the ditch. In this manner the fence is rendered quite impenetrable, and these weak places, which in common are perpetually requiring reparation, made the strongest part of the fence. The whole expence of posts, rails, pales, nails, and workmanship, came to but 3*s.* 9*d.*

The utility of the measure was so striking, that I immediately determined never to repair a fence without paling such places.

EXPERIMENT, N<sup>o</sup> 10.

At the same time with the preceding trial I repaired a hedge and ditch at one corner of field F. adjoining S. The ditch was filled by time, and the bank much out of repair ; the men took it upon the same terms as N<sup>o</sup> 9. It is 12 perches long. I should remark that the ditch not only changed its course, as mentioned in N<sup>o</sup> 9, but a gate was situated in this fence which was the occasion of my practising a further improvement not common in farms, though executed sometimes by gentlemen around their homesteads. I paled across the ditch as before, and the vacancy being large the total expence came to 4*s.* 10*d.* The improvement I mentioned concerning the gate was adding a pale about three feet long to each gate post.

I had!

I had frequently observed that when other parts of the fence were found, a gap is generally met with on each side the gate. There is some difficulty in joining a hedge to the gate-post; it will inevitably be weak there, and especially as the ditch cannot there defend it. A hog will run his nose close to the gate-post, and rush through in spite of the weak opposition he in common meets with; but when a rail of three or four feet long is fixed at one end to the post, and the other run into the hedge, and pales nailed to it, close to the gate-post, and from thence shortening as the bank rises, until some of them are not above eighteen inches long; with such a fence the utmost efforts of any cattle can no more penetrate than at any other place. The expence of paling on one end of this gate came to 2s. 3d. and the other end 1s. 10d; together 4s. 1d; which added to 4s. 10d. for the pail in the ditch, comes in all to 8s. 11d. This expence may appear heavy; but it should be considered that throughout a whole farm very few places of so small an extent as twelve perches would have both a gate and a changing ditch to do. In this farm are many hedges from thirty to fifty perches long with neither the one or the other, so that the expence, to go completely through a whole farm, would amount to but little, compared to the striking utility of it.

#### EXPERIMENT, N<sup>o</sup> 11.

In June 1766, I clipped some hedges with garden shears that had been clipped every year; I did 150 perches of it, at the price of 1½d. My principal design in registering the work, was the opportunity of making a few observations on this species of fences, which are such great favourites with many people.

They are for horses, cattle, &c. extremely good and perfect, and with a ditch particularly. But from the minutest observation I have been able to make on them, I have great objections to them for a common farmer's fence. In the first place they are not impenetrable to hogs, even in their greatest perfection of many rows of quick: and a fence that will not keep out a hog, is to a farmer worthless; for by that time a hog has been three or four times through a place, it will be sufficient for a sheep, and by that time a flock has been through once or twice, every thing else will follow. Another great objection to them is their requiring being cut down to the ground so often; for if this conduct is not pursued they will grow quite ragged at bottom, with such numerous vacancies among the stems of the thorns, that a whole herd of swine would run through in every perch without any difficulty: if to obviate such inconvenience the hedge be regularly cut every certain number of years, then they are liable to all the objections to common hedges, for while the quick is springing up again, a dead hedge of pales, or herdles, or some other method must be practised to defend it. Add to this the expence of clipping, which is 1½d. annually, which alone amounts, in a course of years, to more money than



than the reparations of both hedges and ditches in common. Lastly, they yield the farmer no firing; for the annual clippings are nothing of that sort; all which, to farmers, are such objections, that I am amazed they should ever have been recommended to them. As to gentlemen, who chuse them for their *beauty*, I readily consign them. Those who can be delighted with such remnants of the antique taste of birds, beasts, and monsters in green, as *green walls*, highly merit the proportion such unnatural conceits.

EXPERIMENT, N<sup>o</sup> 12.

If the reader turns to N<sup>o</sup> 6, he will find a fence repaired, and a new set hedge made: this was executed only last winter, and it is extremely observable that the hedge was scarcely made before it was ruined with wind and snow, insomuch that I found it absolutely necessary to new do the whole this winter; I was myself a witness of whole perches of this paltry hedge carried into the ditch at once. I determined to do it with flakes and edders.

## EXPENCES.

	£.	s.	d.
241 perches hedged with flakes and edders, at 2½d. -	0	5	1½
9 ditto, the ditch scowered and the bank mended, at 6d. -	0	4	6
3 loads of buthes, - - - - -	1	1	0
280 flakes, - - - - -	0	7	1
280 edders, - - - - -	0	7	1
450 quick, - - - - -	0	1	0
Total,	2	6	7½

Or 1s. 5d. per perch.

This is within half a crown in the whole of the price of the hedge alone; I before remarked the utility of discovering from experiment the expences of all parts of husbandry work, particularly in relation to the breaking up and improving of waste lands, as well as common management; for no calculations are of value unless founded upon experimental data.

But what are we to think of the ~~blest~~ hedges of this country, that require new making every year. These set hedges are particularly execrable; of which I think there cannot well be a stronger proof than this experiment. These cheap, compendious practices in agriculture are mostly the children of avarice alone; but in the case of fences this country is particularly unfortunate, for the best stake and edder hedges are of such short duration, that the expence of keeping them in good order is very great.

In those counties where nothing but horses, cows, or large heavy sheep are kept, the article of fences is not important; but in this neighbourhood there is a practice among a few good farmers, and which I have followed with par-



ticular attention; it is that of feeding swine with clover, of which I have already made mention in another place. The hogs are locked into the field the middle of May, and see no more of home till Michaelmas; they are taken from the farm yard, and their wash, and consequently long much, for a few days, to get home: in such a situation it may easily be imagined that the fences must be excellent to keep them in. I have never ventured my hogs in this manner without viewing the fences around the field with a particular attention, to see that the hedges were strong, and totally free from gaps—pales at the ends of the gates, and where the ditches change their course—the ditches themselves deep and clean—the gates locked for fear of being left open, and all other circumstances in proper order. This husbandry is alone sufficient to bring the fences of a farm into excellent order, which is of itself a great point. Had I continued some years longer on this farm I should have got the fences into as perfect order as the wretched dead hedges would allow. But upon any large quantity of land it is a work that requires time to execute.

#### EXPERIMENT, N<sup>o</sup> 13.

In the winter of 1766, repaired a fence against field K, 9 perches long; the ditch was almost filled by water, which in heavy rains drained into it, and the hedge but just afforded wood enough to make the new one of stakes, edders, &c. I made the ditch 5 feet broad, 4 feet deep, and 2 feet wide at bottom, for which, with the hedge, they had 1s. a perch. A pale was fixed at each end of a gate, and at the corner of the field where another ditch joined it, in the manner I before mentioned; the want of which is, in this case, equal to that of a ditch changing its course. The expence of the paling by the gate was 2s. 9d. and at the junction of the ditches 6s. 3d.

#### EXPERIMENT, N<sup>o</sup> 14.

At the same time as the last experiment, I added rails and pales at the ends of many of my gates, in fences that did not require being otherwise repaired; the following is a list of the expences.

								£.	s.	d.
N <sup>o</sup> 1.	cost me,	-	-	-	-	-	-	0	4	8
2.	-	-	-	-	-	-	-	0	5	11
3.	-	-	-	-	-	-	-	0	7	0
4.	-	-	-	-	-	-	-	0	3	6
5.	-	-	-	-	-	-	-	0	2	2
6.	-	-	-	-	-	-	-	0	2	6
Total,								1	5	9
Or 4s. 3½d. each.								I do		

I do not think this expence very high ; but I am confident it bears no proportion to the utility of it. Landlords should execute all works of this kind before they let their farms ; they have much better means of doing it than tenants ; and the possession of their own timber is an advantage that would, in their hands greatly reduce the expence : what is here minuted includes it purchased of the carpenter.

EXPERIMENT, N<sup>o</sup> 15.

At the same time paled several ditches, where they joined in divers fences about my farm, in some three, and in others four united at a place : whoever has remarked the common fences at such places, has doubtless seen them particularly weak there. In my farm I found many gaps made by cattle at such places, when the rest of the fences have been in very good order. This determined me to pale such places. The following are the minutes of the expence.

							£.	s.	d.
N <sup>o</sup> 1.	three ditches join,	-	-	-	-	-	0	6	6
2.	ditto,	-	-	-	-	-	0	6	0
3.	ditto,	-	-	-	-	-	0	5	6
4.	ditto,	-	-	-	-	-	0	5	0
5.	ditto,	-	-	-	-	-	0	7	6
6.	four join,	-	-	-	-	-	0	9	6
7.	ditto,	-	-	-	-	-	0	8	6
8.	ditto,	-	-	-	-	-	0	8	6
9.	ditto,	-	-	-	-	-	0	7	0
10.	ditto,	-	-	-	-	-	0	6	0
							<hr/>		
							3	10	0

Or 7s. each.

They were all substantially executed ; several with double rails, and some, where the ditches were deep, with triple ones, the stuff all oak ; much of the paling outside flabs, which are very strong. In the stile of hedging the expence appears great, but if the durability is taken into the question, in these spots which are so particularly weak and for ever requiring reparations, they are undoubtedly cheaper than hedging.

EXPERIMENT, N<sup>o</sup> 16.

Paled across the openings in several ditches where they change their course, at the same time as the preceding trials. The expence as follows.

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NV 1.

N <sup>o</sup>	1.	2.	3.	4.	5.	6.	7.	8.	9.	Total,	£.	s.	d.
	-	-	-	-	-	-	-	-	-	-	0	2	3
	-	-	-	-	-	-	-	-	-	-	0	2	6
	-	-	-	-	-	-	-	-	-	-	0	3	4
	-	-	-	-	-	-	-	-	-	-	0	3	8
	-	-	-	-	-	-	-	-	-	-	0	4	0
	-	-	-	-	-	-	-	-	-	-	0	5	0
	-	-	-	-	-	-	-	-	-	-	0	5	6
	-	-	-	-	-	-	-	-	-	-	0	5	10
	-	-	-	-	-	-	-	-	-	-	0	6	6
	-	-	-	-	-	-	-	-	-	-	1	17	7

Or 4s. 2d. each.

Upon these three experiments I must be allowed to remark that the very great expediency and profit of the practice induces me strongly to recommend it to my readers. I have found that no other method, nor the strictest attention to the fences in general will answer the purpose. I have expended much money in making as complete fences as the country method will allow, and secured them so well as to be absolutely impenetrable while the dead hedge lasts, and also after the live one gets up; but all has been in vain—the money quite thrown away, for want of these weak parts being done in a better manner than can possibly be effected by stuffing in dead bushes alone; they are of very little strength at first, and presently rotting, swine find scarce any difficulty in pushing through them. After them come sheep, and then the fence is done with. Repairing such places is an endless expence, for men must be taken from their business at all times, and perhaps the busiest, to prevent crops being utterly ruined; *at the same time that the fences are in excellent order, to a common viewing.*

The damage which crops receive by hogs and sheep \* accidentally getting into fields out of which they ought to be kept is very considerable; such losses cannot be accurately known, which is the reason they do not make a greater impression, but a small drove of hogs, or a very few sheep, cannot get into a corn field without doing far more mischief than would pale an opening, or a junction of ditches. And many fields receive damage enough in one crop to pay for securing all the weak places round the whole, and two or three adjoining fields. If this loss was added to the expence of keeping these weak places in the common state of repair, the amount would be found double, perhaps treble that of paling them at first; and this, exclusive of many other inconveniencies and expences that bad fences are attended with.

\* I never had any but Norfolk and Suffolk sheep; they are as troublesome, respecting fences as any swine in the world can be.

But the common farmers are so very saving of present expences, that they often incur the loss of ten shillings next year, to save two in this: many of them are so poor, that we cannot be surprized at this conduct, but it equally belongs to those that are rich.

EXPERIMENT, N<sup>o</sup> 17.

In February 1767 repaired 20 perches of fencing contiguous to my yard; the ditch being small and almost filled, I cut it 6 feet wide at top, 5 feet deep, and 2 wide at bottom; and at the same time made a new stake and edder hedge. For the whole of which the men were paid 3s. 3d. per perch.

EXPENCES.		£.	s.	d.
Digging and making the hedge at 3s. 3d.	-	3	5	0
2 loads of bushes,	-	0	14	0
200 stakes,	-	0	5	4
200 edders,	-	0	5	4
Facing the bank,	-	0	1	8
Paling the opening where the ditch joined another,	-	0	3	0
Total,	-	4	14	4

Or 4s. 8½d. per perch.

EXPERIMENT, N<sup>o</sup> 18.

In the spring of 1767 made a new ditch between M\*. and Q. 5 feet wide at top, 18 inches at bottom, 4 feet deep, and 20 perch long. A new stake and edder hedge was made, and the bank faced; the price 1s. 8d. per perch.

EXPENCES.		£.	s.	d.
Digging and making,	-	1	13	4
2 loads of bushes,	-	0	14	0
200 stakes,	-	0	5	4
200 edders,	-	0	5	4
2000 quick, (a double row)	-	0	10	0
Total,	-	3	8	0

Or 3s. 4½d. per perch.

EXPERIMENT, N<sup>o</sup> 19.

In the winters of 1765 and 1766-7 I made several bridges over ditches at gateways: this work I found extremely necessary and important; and as I executed

executed it in different manners, I shall insert each in these minutes. Some I did with decayed trees, the hearts of which having rotted out, were direct tubes, and being split in halves, each tree made two wooden arches. The method is to dig a trench to unite the two ditches, just wide enough about half the depth to admit the half tree, and then dug narrower. The wooden arch is then laid in, and being covered with mould forms a bridge: the expence of doing one in this manner was as follows:

	£.	s.	d.
Digging and filling, - - - - -	0	1	6
Cutting and splitting the tree, - - - - -	0	0	7½
Cost 1s. 3d. therefore value of the wood half, - - - - -	0	4	0
	<hr/>		
	0	6	1½

This method answers the purpose very well, if the tree happens to be of a proper length. But the reader may easily imagine that this wood is not very durable, though oak, for none will do for the purpose but one that is quite rotten within. Another of these cost me,

	£.	s.	d.
Digging and filling, - - - - -	0	1	9
Cutting the tree, - - - - -	0	0	3
Drawing it, - - - - -	0	0	3
Value, - - - - -	0	7	6
	<hr/>		
	0	9	9

This whole tree was used, for the workmen apprehending it would split in pieces if attempted to be divided, it was laid at the bottom of the trench for the water to run through. Another cost me,

	£.	s.	d.
Digging and filling, - - - - -	0	1	9
Cutting and drawing the tree, - - - - -	0	0	9
Value, - - - - -	0	9	6
	<hr/>		
	0	12	0

This also was a whole tree: the average of these three trials will shew nearly I believe that of my practice in this method in general.

	£.	s.	d.
The first, - - - - -	0	6	1½
The second, - - - - -	0	9	9
The third, - - - - -	0	12	0
	<hr/>		
	1	7	10½

Average, 9s. 3½d.

This

This method is not expensive, but yet I cannot recommend it. It is not lasting. The trees are not to be had in any quantity; many farms not having one upon them; and a practice which must necessarily be so very confined is *therefore* good for nothing.

EXPERIMENT, N<sup>o</sup> 20.

At other gateways I made bridges of oak plank and slabs, which are durable. The expence of one as follows:

	£.	s.	d.
Digging a trench and laying and covering the plank, -	0	1	3
Value of the plank, - - - - -	0	14	0
	<hr/>		
	0	15	3

## ANOTHER:

Digging and covering, - - - - -	0	1	6
Value of the plank, - - - - -	0	13	0
	<hr/>		
	0	14	6

## ANOTHER:

Digging, &c. - - - - -	0	1	3
Plank, - - - - -	0	12	0
	<hr/>		
	0	13	3
<hr/>			
The first, - - - - -	0	15	3
The second, - - - - -	0	14	6
The third, - - - - -	0	13	3
	<hr/>		
	2	3	0

Average, 14s. 4d.

Upon this method I should remark, that it is greatly preferable to the former, both in durability, and the circumstance of being every where easily executed. Oak plank is to be had every where; consequently any farmer in the kingdom may command it, as far as the expence will answer. Considering these points, I think it much more worthy of commendation than the method of hollow trees.

EXPERI-

EXPERIMENT, N<sup>o</sup> 21.

Among other methods of making my gateways, I built one brick arch, the expence as follows:

	£.	s.	d.
300 brick,	0	6	0
100 tile,	0	2	0
8 bushels of lime,	0	4	0
Workmanship,	0	10	3
	<hr/>		
	1	2	3
	<hr/>		

This is beyond a doubt the most complete method of doing this business; an arch lasts for ever; nor have I observed any (though some on this farm have been done many years) that have wanted repairing: but this is owing to their being made of a good length; for if they are but as long as the gate and posts, the ends will be soon destroyed by carting: they should be of a due length, to be out of all danger from wheels of carriages drove by careless servants. A landlord putting a farm into thorough repair, would, in my humble opinion, act upon very narrow principles if he did not turn arches at every gateway in it, under which water was required to run. The duration of them demands a landlord's attention stronger than a farmer's; nor would the expence over a whole farm be any formidable object; for not above one gate in three, or at most half the number, could be supposed to require them.

EXPERIMENT, N<sup>o</sup> 22.

My trials in this part of husbandry having extended to several common practices, and none that I had done being satisfactory to those who considered cheapness as the *sine qua non* of these matters. I attempted one method which I had not seen executed in any other person's grounds; this was to convert the gateway into a large covered drain, upon the same principle as those in fields. With this view I dug a trench 2 feet wide at top, 1 foot at bottom, and the depth of the ditch; at each end I left a space of solid earth, 2 feet 6 inches over; through this I made the men cut a hole at the bottom, by boring through with their spades: this hole was about 12 inches diameter; the trench I filled about 18 inches deep with large faggots, thrusting one through the holes at each end; upon the faggots I laid straw, and then the earth.

EXPENCES.						£.	s.	d.
Digging and filling,	-	-	-	-	-	0	1	3
Wood,	-	-	-	-	-	0	2	0
Straw,	-	-	-	-	-	0	0	3
						0	3	6

I made two of these, and they both came to the same price.

They answered perfectly well, though a pretty considerable stream runs down this ditch in winter, yet I never once knew it stop. The expence is very trifling; and I think the whole so simple, that common farmers, who are under the necessity of carrying the water through the ditches, cannot do better than to use the method.

#### GENERAL OBSERVATIONS ON these EXPERIMENTS.

I do not apprehend there is in the secondary range of rural oeconomies, a point of more consequence than fences. In open countries, farmers manage it is true without any; but, exclusive of the numerous inconveniencies and losses thereby occasioned, there is a benefit which inclosed countries do not possess;—it is the farmers not depending on them: knowing that they can possess no such advantages, they conduct their business upon the plan of their circumstances, and receive not the disappointments of a broken dependency. But in inclosed countries the case is different, farmers depend totally on their fences: they will turn a herd of swine, a flock of sheep, a dairy of cows, and a team of horses into a field of clover that joins an hundred acres of wheat, without any attendants, trusting solely to their fences: in such a course of business is it not demonstrable that the dependance on the fences is very great? And that the necessity of their being very strong is particularly urgent?

I have in these experiments explained the whole management of fences in Suffolk, and made such remarks on them as their effects or excellencies called for in the practice of my business. Upon reviewing the whole I cannot avoid repeating, that the ditches I have generally used have been of excellent service, and converted in many instances very bad fences into good ones. But the objections to this country hedges are so great, that they are alone sufficient to remove their husbandry very far from perfection.

The expences of reparations are enormous; with the provoking circumstance of seeing new fences, raised at a great expence, destroyed almost as soon as finished. A new made ditch and a new made hedge together form an impenetrable fence; but this excellency lasts no longer than the hedge, which is perhaps made in December and destroyed in January; or, uncommon ill luck excluded, made one winter and in ruins the next. Then succeeds two



or three years in which the fence is very inadequate, that is till the live wood shoots up thick and strong enough to perform its office without a dead hedge, which by the bye it very seldom ever arrives at.

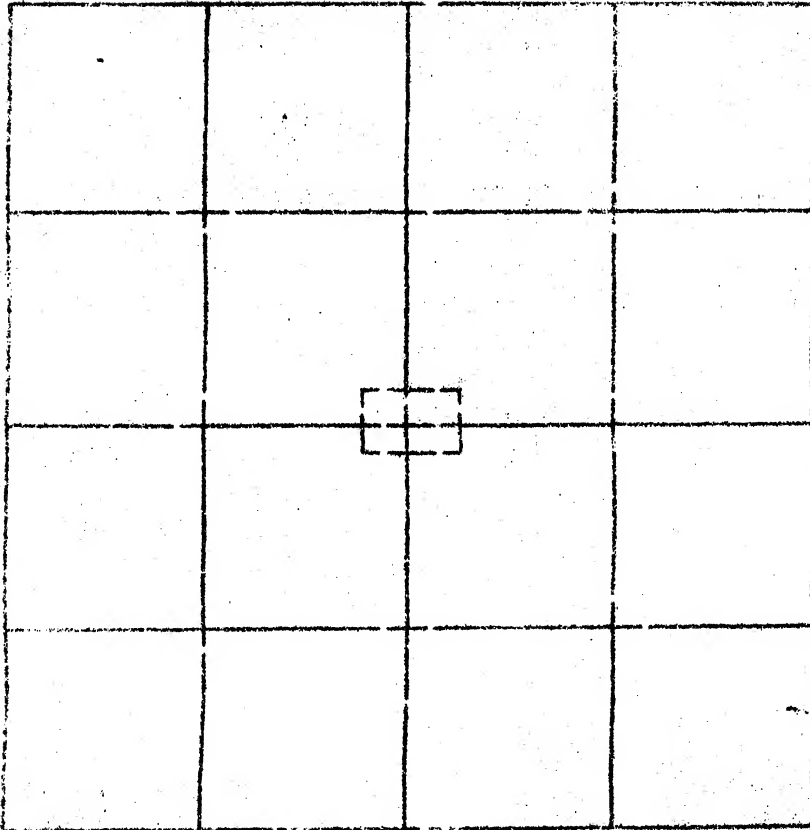
This great deficiency in our hedges arises from all the wood of the new made hedges being dead. Since most of the preceding experiments were minuted I have been informed, that in the custom of *plashing* hedges the workmen leave a great part of the old live hedge standing; all the sticks that are properly situated for hedge stakes, they cut off about 2 or 3 feet from the bank, and the rest of the wood uncut they bend down and weave into the hedge with the dead wood. I do not remember having seen any of these hedges, but I have attended so particularly to the mischiefs of our method, that reason tells me this must be far superior. The single circumstance of a few of the hedge-stakes being alive, would make a vast improvement in our fences, I have often remarked, that many of my hedges have been ruined from the rottenness or weakness of the hedge-stakes, which give way to the weight of the hedge when loaded with snow. This could not be the case if a live hedge-stake was scattered here and there: this is an improvement that I had determined to execute, if possible, had I staid long in this farm, though I doubted not of meeting with great difficulties from the obstinacy of workmen: our quick is all so low in the bank, that I am sensible the fence would not be so high, but this disadvantage would be far more than compensated by the benefits. Another method, if this failed, would be to drive down willow or fallow stakes on the top of the bank, to serve as live hedge-stakes, which would enable the farmer to make a strong dead hedge in the same place he uses now; and when both hedge wood and stakes were well grown, they should both be plashed, and new stakes driven in for the new hedge, after which there would always be plenty of live wood for every purpose. Either of these methods it is much to be wished was executed in this neighbourhood, where the fences are so expensive to keep in order, according to the methods pursued at present.

But as much as I condemn our hedges, I cannot avoid at the same time doing justice to our ditches: the good farmers in this country have great merit in being at the expence of digging deep ditches, and constantly cleansing them whenever the fence is repaired, by which means they are always kept at a good depth; the common agreement for hedging, is to *cut and make the hedge and scower the ditch*; which is, first to shovel out all the loose earth, and then to dig one spit at the bottom for repairing the bank. This is a very good practice, as it keeps the ditches on the improving hand. But many husbandmen of spirit in this neighbourhood, are at greater expences in their ditching, making them both deeper and wider than usual; and bringing all in their farms to be from 3 to 4 feet deep, and from 4 to 5 feet wide.

This



P. 127



This is an excellent practice, and particularly in a wet soil, for in such the ditches are both fences and drains.

The preceding experiments may be of some further utility in determining the expences of inclosing open countries, and consequently the degree of profit attending the undertaking. Many writers have discussed the subject of inclosing with great abilities, and proved that the business is highly expedient, but when the expences are asked, they are silent. This is one branch of that vast system of reasoning which books upon agriculture contain, and also one in which they are equally deficient in facts. It certainly is of consequence to be able to state the expence of all improvements in husbandry before they are undertaken; for such works, like others, must have a better chance of thriving under the support of clear accounts, than when performed in the dark. A measure that requires a thousand pounds may be of the greatest advantage to a man, who would be thrown into difficulties if it required twelve hundred.

The clearest method of rendering these trials of use to such gentlemen as are deliberating upon the expence of an inclosure, in a country similar to this, will be to state such an undertaking of a certain extent, and suppose the fences to be made at the preceding prices.

This figure represents a square mile of country, consisting of 640 acres, divided into fields of 40 acres each; consequently there are ten miles of fences.

One mile I shall suppose done as Experiment N<sup>o</sup> 17, which is a new ditch 6 feet wide at top, 5 deep, and 2 wide at bottom. with a new stake and edder hedge made: this, exclusive of the 3s. in that experiment for paling, is 4s. 7d. *per* perch. To this must be added 6d. *per* perch for white thorn, as in Experiment N<sup>o</sup> 7; in all 5s. 1d. ——— This is a very uncommon ditch in new inclosures; but as a part of the farm may want draining, and as it is a great advantage to have a very deep ditch, into which others may be laid on occasion, I shall state it.

The remaining nine miles I shall suppose executed as N<sup>o</sup> 7, which is 4 feet wide at top, 1 at bottom, and 3 deep; the hedge a new stake and edder, and the bank planted with white thorn, the price 3s. 8½d.

The number of gates is 27. The price of them complete is not in the preceding trials, but the gate, posts, irons, and setting down, amount in this country to 1l. each, but they are very strong, cross-morticed, and the irons weighty.

I shall suppose a brick arch turned to the twenty gates as in Experiment N<sup>o</sup> 21.

Posts, rails, and pales added at the ends of all the gates, as in Experiment N<sup>o</sup> 14.

There are twenty-one places where three or four ditches join, these secured as in Experiment N<sup>o</sup> 15. It is to be observed, that, as the gates are placed at the corners of the fields, and the ends paled, such pales will join in many places with those at the openings of the ditches, so as to form an unbroken system of pales at all the weak places in the whole farm.

EXPENCES.				£.	s.	d.
Fencing 1 mile or 320 perch at 5s. 1d.	-	-	-	81	6	8
Ditto 9 miles, or 2880 perches, at 3s. 8½d.	-	-	-	531	0	0
Twenty-seven gates, &c. complete,	-	-	-	27	0	0
Twenty arches at 22s. 3d.	-	-	-	22	5	0
Paling the ends of the gates at 4s. 3½d.	-	-	-	5	15	10½
Twenty-one places in the ditches paled at 7s.	-	-	-	7	7	0
Total inclosure,	-	-	-	674	14	6½

Which is 1*l.* 1*s.* 1*d.* *per* acre.

For the amount therefore of a guinea an acre we find that a tract of open land may be inclosed in the most complete manner possible, according to the practice of this country. Very few farms are any where to be found, the fences of which ever were in such order as here supposed; and yet I do not think the expence is extravagantly high; however, there is no method of lowering it, without proportionably reducing the quality of the fences. But I should remark, that in such an inclosure the clause of not turning sheep into the fields of nine years would be totally useless: the quick would be absolutely and totally safe as I have many times experienced.

Respecting the expence of repairs, I suppose (to obviate the numerous objections to constant dead hedges) that a large part, (suppose half) of the hedge-stakes were fallows or willows; that single circumstance will make a great alteration in the duration of the hedge: with such an advantage at setting out, and with the common attention to mending accidental gaps, I suppose the fence to last four years. At the end of which time I would advise the old dead hedge to be made into faggots for burning, leaving the live hedge-stakes standing, and the ditch scowered. Then I would by all means propose that those hedge-stakes should be plashed, and some new ones of the same wood drove down in other places, among those of the new dead hedge, with only one precaution; that, in plashing, the points of the willows, &c. laid down, be turned *from* the young quick.

EXPENCES.

EXPENCES.		£.	s.	d.
Cleansing and hedging 3200 perches at 6d. as in Experiment N <sup>o</sup> 5,		80	0	0
Bush faggots 4 to the perch, as in Experiment N <sup>o</sup> 12, but deduct 1 for the plashtes which supply the place, therefore 9600 faggots at 7s. per load of 40		84	0	0
29866 cadders, the proportion of Experiment N <sup>o</sup> 12, at 2s. 6d. per 100,		37	0	0
Stakes ditto,		37	0	0
		<hr/>		
		238	0	0
Deduct the value of the old hedge, suppose 2 faggots to three perches worth 5s. per load of 40, expences deducted,		13	10	0
		<hr/>		
Total,		224	10	

Which is 7s. per acre, or 1s. 4d. per perch.

After this work the hedge will be lasting and impenetrable; for the quick will every day increase in branches and strength, the plashtes will shoot out among the new dead hedge, and the new hedge-stakes do the same, so that the whole will undoubtedly last until it is proper again to cut the quick, at which time much of it might be plashted into the hedge. This period may be supposed ten years. Thus the whole preceding expence of fences will be for 14 years.

	£.	s.	d.
First expence,	674	14	6½
Reparation,	224	10	0
	<hr/>		
Total,	899	4	6½

Which is 64l. 4s. 7d. per annum, and 2s. per acre per annum.

I apprehend the reader will allow this expence to be very trifling, considering the excellency of the fences in every particular: I do not apprehend there are many farms in common management well fenced for a less expence. Two shillings per acre expence for the first fourteen years, is a very trifle for a new inclosure on so complete a plan, and the first renewal; indeed it is so low, that the infinite advantage of inclosing is hence sufficiently proved; for any person may judge if the increase of rent would not repay this with several hundreds per cent. profit.

When this fence (suppose at the end of ten years) came to be again renewed, there would be two very different methods of doing it. If a gentleman kept the land in his own hands, and was unsolicitous about firing, I should recommend

commend the grubbing up all the fallow and willow roots to their total extirpation, which would be very easily done without any injury to the quick, from the distance between them; the one being on the *top* of the bank, and the other on the *side*. And it would also be done without expence, any workman would take them up for the wood. When the old dead hedge was removed, and this work done, then the quick should be plashed; a hedge-stake should be left at every yard distance, and enough of the rest laid down to form a strong hedge, with no *dead* assistant except the edders. From which time the fence would ever be impenetrable, without extraordinary expence.

The other method I should recommend to a farmer is this; to keep all the hedge stakes alive, out of the fallow, &c. stakes, and to form, by means of alternate plashing and cutting, a live hedge of willow, &c. with numerous branches of the white thorn interwoven with it: in this method there will be two hedges, one of fallow and willow intermixed with plashes of white thorn, and the other all of white thorn growing naturally. No fence can be more impenetrable than this; but the uniformity of the appearance would not, to a gentleman's eye, be equal to the former: the profit, however, of the practice would much exceed it, as the faggot wood of the willow, &c. would much more than pay all future expence of reparations.

I shall, in the next place, suppose a gentleman in possession of a farm or farms, containing the same quantity of fences, but old ones, which he, either for his own occupation or to let to advantage, chuses to bring into good order: in such case the expences will be as follow:

	£.	s.	d.
Converting 320 perches of old fences into new ones; the ditch 6 feet wide at top, 2 at bottom, and 5 deep, and a new stake and edder hedge at 3s. 3d. per perch, as in Experiment N <sup>o</sup> 17.	52	0	0
Ditto 2880 perches to 4 feet wide at top, 1 at bottom, and 3 deep, at 9d. as in Experiment N <sup>o</sup> 9.	108	0	0
Suppose 10 new gates at the former price,	10	0	0
20 arches ditto,	22	5	0
Paling the ends of gates ditto,	5	15	10½
21 places in the ditches paled ditto,	7	7	0
Total,	205	7	10½

Which is 6s. 5d. per acre; or 1s. 3½d. per perch.

It is to be observed that in this estimate I have not calculated any product from the fire-wood of the old hedges, exclusive of what is wanting for the new ones, whereas, the quantity of such could not fail of being considerable, even allowing

allowing for the thick hedges supplying the deficiencies of thin ones. Another circumstance of great importance is, that these hedges, supposing them plashed, will never want any other repairs than the common cuttings when the wood is at full growth, and which will fully answer the whole expence, with profit in the farmer's pocket.

The great importance of bringing the fences of a farm into such complete order cannot be doubted : it is highly incumbent on tenants themselves to do it, if they have long leases ; for the advantages of occupying farms so completely fenced are too obvious to need recapitulating here ; and the expence divided into a proportion *per acre per annum* would be found too small to weigh the least in opposition. But landlords are the men to whom I would particularly recommend this husbandry ; they, we should suppose, have or can command money sufficient ; and by whom whole farms might be done at once. I cannot but earnestly call upon all such to take their farms into their own hands by rotation ; or at least to enter upon the premises near the end of the leases for such repairs as these. To bring all the fences into the complete order here specified ; then to calculate the exact expence, and increase the rental *on that account* in such a proportion as to pay themselves exactly 15 *per cent* for the money expended : I do not think we should state a less interest, because it is undoubtedly to be made in numerous other branches of improvement belonging particularly to landlords, and because any tenant may better afford to pay it than farm without such advantages ; but this, at the same time, shews the great profit of their hiring farms that are in a slovenly condition, to improve them themselves.

Nor can I dismiss this subject without remarking at how small an expence the extraordinary parts of the fences, such as the arches and paling, are performed : in a square mile of land the whole amount is but little above thirty-five pounds, for which small sum the fences are rendered perfect, and the whole farm reduced to that complete order which is every where desirable, for little more than a shilling an acre. I will venture to assert the expence is nothing : it will bear no comparison to the prodigious utility of it. Without such precautions, the very best of fences are useless, or at least perpetually expensive, for the common methods of stuffing bushes into such weak places costs money, though it answers scarce any purpose ; and the damage of cattle breaking into fields out of which they ought to be kept, is an evil enormously expensive, quite beyond calculation. But in whatever light the point is viewed, there can be no doubt but the improvement proposed will be found extremely profitable.

END of the ELEVENTH BOOK.





E X P E R I M E N T A L  
A G R I C U L T U R E.  
B O O K XII.  
O F M A N U R E S.



## B O O K XII.

## O F M A N U R E S.

**T**HIS subject is one of the most fruitful in husbandry ; and, notwithstanding its great importance, very little known : my situation, respecting the neighbourhood of a large city, has not allowed me to try the effects of so many sorts as I wished to do ; but during the five years I have conducted this course of experiments, the trials I have made on such manures as were to be had have been extremely numerous ; indeed the minutes I took of them occupy so much paper, that were I to insert a quarter of them here, they would not only render this work much too voluminous, but would, at the same time, prevent my inserting many other matters which should on no account be passed over. It is for this reason that I shall only lay before the reader the trials most immediately connected with the other parts of these experiments ; for instance, the œconomy of raising manure at home.

## C H A P. I.

## Of the F A R M Y A R D.

**I**N this country it is the practice of the best farmers to confine all their cattle through the winter to their straw yard, not only for feeding them with straw, hay, or turnips, but also for the purpose of raising manure: the yard is either formed by the barns, stables, and other offices, or partly inclosed by stacks of wheat stubble, built by the tenants; for the purpose: they litter them well with stubble or straw. This system I adopted, and the following trials will shew the quantity of dung raised by various cattle.

EXPERIMENT, N<sup>o</sup> 1.

Quantity of manure made in winter 1763-4.

The yard was littered with five loads of wheat stubble, and the waste made by the cattle in foddering with straw. They were

4 cows,  
2 yearlings,  
7 hogs.

The dung was in May carted out to the amount of 50 loads, 40 bushels each, and made a compost with 30 loads of clay in layers. Thirteen head of cattle making 50 loads may be called four loads each.

EXPERIMENT, N<sup>o</sup> 2.

Quantity of manure made in winter of 1764-5.

In November 1764 littered the yard with 12 loads of stubble, which was chopt up, and raked into heaps in October. The common price for the labour

bour is 1s. 6d. *per acre*. This quantity of haulm made a very warm bed for my cattle, and their foddering constantly all winter upon it must necessarily add to its quantity by their refuse straw, and greatly enrich it by their treading, dung, &c. The straw of a great part of my barley crop was so very bad, that it was spread like the haulm. Two hog-cots opening into the yard were cleaned into it, as was the cow-house, in which were stalled at turnips two Scotch bullocks, that were regularly littered down with straw and cleaned every day. I should also observe that some quantity of dung arose from the cows while tied up for suckling their calves. The cattle were

4 cows,  
2 heifers,  
2 bullocks,  
12 swine.

The yard produced 119 loads (40 bushels each) or 6 loads to each head of cattle.

#### EXPERIMENT, N<sup>o</sup> 3.

Quantity of manure made in winter, 1765-6.

In autumn 1765 littered the yard with 14 waggon loads of haulm and one of weeds. The cattle

6 cows,  
4 oxen, until Feb. 13th,  
1 yearling,  
40 hogs until Nov. 29th.

The oxen were housed the 13th of February, but their house regularly cleaned out into the yard; the hogs confined to their yard and not cleaned into the rack yard. The quantity of manure 156 loads. If we call the swine 12 for the whole winter the number of cattle will be 23, and the manure reckoned 7 loads *per head*.

#### EXPERIMENT, N<sup>o</sup> 4.

Quantity of manure made in winter 1766-7.

In autumn littered the yard with 3 waggon loads of haulm, and foddered and fed in it the straw of 2 acres of wheat and 60 of spring corn.

2 Oxen stall-fed, but cleaned into the yard from October 27th to March 2d.  
1 Cow ditto, from December 24th to March 2d.

2 cows,

1 steer,

1 horse 3 months,

4 hogs, 14 fows and boars, with 40 pigs in sties but cleaned into the yard.

March 2d, took in 4 oxen and 3 heifers to joist in the yard on turnips and straw, both given in cribs; and the same day turned out my own 2 oxen and fat cow to them. Kept the seven a month.

My own cattle at hay in the yard till May 13th.

The hogs, as there were so many pigs, may be called 20 head; the oxen, cows and steer 6 more; the horse and 7 joisted beasts 1 more (as the fat cow was somewhat short in time). This is in all 27 head. The quantity of manure was 290 loads, or about 11 loads *per* head.

OBSERVATIONS.						Loads.
The quantity of dung <i>per</i> head in 1763-4,	-	-	-	-	-	4
In 1764-5,	-	-	-	-	-	6
In 1765-6,	-	-	-	-	-	7
In 1766-7,	-	-	-	-	-	11

Average 7 loads.

These quantities of dung are by no means so considerable as they ought to be; for I purchased very little litter, whereas the cattle would have converted much more into excellent manure; but not being experimentally clear in the profit of buying stubble and straw for the mere purpose of turning it into manure, I did not exert near so much spirit in this part of my husbandry as I design in future; being at present very clear in the advantage of so doing. But seven loads *per* head, hogs included, are not very trifling: that proportion would tend greatly to the improving of a farm whereon a proper stock of cattle was kept.

The seven loads may be supposed to waste to five, in so rotten a state as the farmers will buy dung in from a town: they very often take that which is not half rotten. The price, by the time they get it on to their farm, is not less than 5s. 6d. or 5s. 9d. a load, which raises the five loads to above 25s. a head from all the cattle wintered in the yard: a very great amount.

## C H A P. II.

## Of the H O R S E - S T A B L E.

I Can state this article distinct from the farm-yard, because the stable dung-hill was never mixed with it, being at some distance.

My usual method of managing my horses was to take them into the stable in October, or the beginning of November, as the weather turned out; and to have them well littered with wheat straw, when they are fed with hay; but when they eat straw (which was but seldom) they waste enough to litter them.

EXPERIMENT, N<sup>o</sup> 5.

Quantity of manure arising from six, in the winter 1763-4.

The quantity made this year was 70 loads, (40 bushels each) or 11½ each.

EXPERIMENT, N<sup>o</sup> 6.

Quantity of manure arising from seven, in the winter 1764-5.

The quantity amounted to 111 loads, which may be called 13 loads each.

EXPERIMENT, N<sup>o</sup> 7.

Quantity arising from seven, in the winter 1765-6.

The quantity 144 loads, or 16 loads each.

EXPERIMENT, N<sup>o</sup> 8.

Quantity arising from six, in the winter 1766-7.

The manure 103 loads, or 17 per head.



## OBSERVATIONS.

Quantity <i>per</i> horse in						Loads
1763-4,						11 $\frac{1}{2}$
In 1764-5,						13
In 1765-6,						16
In 1766-7,						17
Average 14 loads.						

This quantity of dung *per* horse I think is considerable; and certainly in its value somewhat reduces to the farmer the expences of his team; two horses may fairly be said to manure an acre of land well.

EXPERIMENT, N<sup>o</sup> 9.

In the summer of 1766, four horses, kept three weeks in the stable on green lucerne, were littered with one load of straw, delivered in for 12s. the dung at the end of the time was carted away, and amounted to 6 loads, the cost just 2s. a load. The wasting enough, in rotting, for arable land, would make it about 2s. 6d. which appears to me to be vastly cheaper than any manure we can buy; and it also shews the expediency of keeping the team in the stable for the purpose of raising manure.

## C H A P. III.

## O F F A T T I N G S T A L L S.

**T**HE sheds, &c. in which I have stall-fed beasts on turnips, &c. are most of them separate from the yard, so that the dung of each is laid by itself; this has enabled me to minute the quantity of manure arising from each cattle separate.

EXPERIMENT, N<sup>o</sup> 10.

In the winter of 1764-5, six black cattle, stall-fed 19 weeks, were littered with 11 loads of straw, at 11s. a load; they made 77 loads of dung; the cost of the straw makes the dung something better than 1s. 6d. a load.

EXPERIMENT, N<sup>o</sup> 11.

In the same winter 2 fatting cows in 9 weeks were littered with 2 loads of wheat stubble at 17s. they made 15 loads of dung. This is 11d. a load.

EXPERIMENT, N<sup>o</sup> 12.

At the same time two steers, stall-fed 9 weeks, were littered with 2 loads of straw at 11s. and made 16 loads of dung. This is 1s. 5d. a load.

EXPERIMENT, N<sup>o</sup> 13.

In the winter of 1766-7, six small beasts, stall-fed 12 weeks, were littered with 8 loads of straw at 13s. and converted them into 49 loads of dung. This is about 2s. a load.

EXPERIMENT, N<sup>o</sup> 14.

In the same winter a heifer in stall-feeding was littered with 1 load of stubble at 6s. which she made into 6 loads of dung. This is just 1s. a load.

## OBSERVATIONS.

		£.	s.	d.
In Experiment N <sup>o</sup> 10, the price <i>per</i> load from straw is	-	0	1	6
In N <sup>o</sup> 11, from stubble,	-	0	0	11
In N <sup>o</sup> 12, from straw,	-	0	1	5
In N <sup>o</sup> 13, from ditto,	-	0	2	0
In N <sup>o</sup> 14, from stubble,	-	0	1	0

Average 1s. 4½d. *per* load.

It is plain that the price of the manure depends on that of the litter; stubble where it can be had is much cheaper than straw; but supposing a man to be forced to have some of each, we find that he raises his dung upon an average at 1s. 4d. a load; now this is a matter of much importance, and well deserves the serious consideration of all farmers who are desirous of improving their land. It appears extremely clear to me, that no way whatever of gaining dung is so cheap as by purchasing straw or stubble for littering cattle. Where can dung, even before it is rotten, be laid on the farm for this price? I might say, where can it be had for double the price? All purchased manures, with carriage on them, will be found beyond comparison dearer. For which reason I cannot but earnestly recommend this part of husbandry to the attention of all farmers, that they may set a proper value on their straw and stubble. How happy are they who have fern, sedge, &c. at command! or who live in countries where stubble is to be had for a trifle!

## C H A P. IV.

## Of the H O G - Y A R D.

THE yard here mentioned is for fattening large numbers of hogs, for the purpose of raising manure. In 1765 I built one with all the adjoining conveniencies. They consisted of the following articles; the prices are added, that others may form a general idea of the expence of these sort of undertakings. A small house, boarded and tiled for boiling, with binns in it to hold sacks of corn, turnips, carrots, potatoes, &c. The cost 18*l.* 18*s.* exclusive of timber. In it a copper, 13*l.*

On one side of it a small pond; the digging of which cost 4*l.* and a pump, 1*l.* 10*s.* to raise water to the copper.

On the other side of the house, two brick cisterns, to contain the food, and receive it from the copper, &c. these were covered by a boarded shed, leaning against the house, and cost 14*l.*

There were two yards, each large enough for fattening 100 hogs; one for the use of the lean swine, occasionally opened into the farm yard; and had a shed against a barn for their lying in at night; this shed cost 2*l.* 10*s.* it was thatched. The other yard had also a shed against the barn, and likewise an arched spanned shed, both thatched, which came together to 4*l.* 5*s.* Around the cisterns was a path paled from the yards, through which pales the food was given. The troughs formed the bottom of the fence, with doors from the lower rail to the inside edge of them; so that the hogs eat in the troughs, on one side of the paling, and the food was put in on the other. All the paling came to 7*l.* 7*s.* Paving &c. the yards to 10*l.* the troughs, &c. &c. 3*l.*

						£.	s.	d.
The boiling-house,	-	-	-	-	-	18	18	0
Copper,	-	-	-	-	-	13	0	0
Pond,	-	-	-	-	-	4	0	0
Pump,	-	-	-	-	-	1	10	0
Cisterns,	-	-	-	-	-	14	0	0
Carried over,						51	8	0
K k k 2						Brought		

	£.	s.	d.
Brought over,	51	8	0
Sheds,	6	15	0
Paling	7	7	0
Paving,	10	0	0
Troughs, &c.	3	0	0
Total,	78	10	0

Besides timber.

By means of one of these yards I fattened 88 hogs in spring 1766, with only one man to attend them; whereas three would not have been sufficient without such conveniencies; they were littered with 9 loads of straw and haulm, that cost 6*l.* 18*s.* And they made 90 loads of very rich dung, valued by several farmers on the spot at 5*s.* a load.

	£.	s.	d.
Value of dung at that rate,	23	10	0
Straw, &c.	6	18	0
Profit in dung,	15	12	0

But they had not half the litter they ought; they would have made 35*l.* worth of manure beyond doubt

90 loads costing 6*l.* 18*s.* are 1*s.* 6*d.* per load.

These particulars surely must prove the vast importance of such conveniencies for fattening great numbers of swine, for the mere purpose of raising manure. Suppose the expence, timber included, to be 110*l.* and the interest called 5*l.* What comparison is there between the expence of 5*l.* a year, and the prodigious utility of having it always in your power to fatten, with scarce any expence of labour, whatever number of hogs you please? With such a convenience, all the pease, beans, barley, buck-wheat, potatoes, parsnips, carrots, Jerusalem artichokes, &c. &c. that are, or can be raised on a farm, may and ought to be applied to the rearing, feeding, or fattening hogs; by which means the farmer has the opportunity of improving his land to the highest degree, and at the cheapest rate possible.

#### GENERAL OBSERVATIONS.

From these trials it appears, I apprehend, sufficiently plain, that the best and cheapest method of raising manure, and, consequently, improving a farm, is by keeping or fattening as many cattle of all sorts as possible; and purchasing as much straw, stubble, &c. &c. as can be had for littering them. By means of this management, excellent dung is raised from 10*d.* to 2*s.* a load; which purchased and brought home would cost 4*s.* or 5*s.* a load.

END of the TWELFTH BOOK.

EXPERIMENTAL  
AGRICULTURE.

BOOK XIII.

OF CATTLE.



## B O O K XIII.

## O F C A T T L E.

**T**HIS subject, I should previously observe to the reader, is here treated in a very confined manner. I have entered into no part of what constitutes so much of many books of husbandry; the diseases of cattle, with receipts and nostrums for their cure: all such matter ever was disgusting to me, nor have I once found the least utility from it: as little have I attended to all the minutiae of management laid down by many writers; and for the material reason, that written instructions will never give that perfect knowledge of the subject which they pretend to. A man that would become a master in the various sorts of cattle, can gain it only by the assiduous and attentive practice of *many* years. That is, the ability of always determining the weight, value, and health of beasts. But let me remark, that very few common farmers attain this knowledge. Many of them keep constant stocks; whereas it is the having a great variety go through one's hands that offers an opportunity. Others on arable farms keep very few: however, I am far from thinking this accurate knowledge of cattle absolutely essential to a farmer: with common practice he may gain a sufficiency to avoid being much imposed on. Accustoming himself to sell for some time by weight, will gradually bring on a judgment of the truth. In the buying of lean stock the fluctuation of prices, and the discovering distempers are all in all. In curing of any he may trust to farriers and cow-doctors, whose experience must inevitably carry them further than he can gain with no experience, and no better drugs than the other: But in all these matters practice is the only master; books are not worth a groat.



I confine myself to the profit and loss of my cattle; with the few circumstances that appeared worthy of registering, with an eye to my own future advantage. But let me remark, that this part of my business admits not of the clear decisions that attend the production of crops. After stating the terms of an experiment, the result must frequently be a matter of opinion, not of weight or measure; nor is it possible here to support such a chain of mere facts as the crops of a field admit of.

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## C H A P. I.

### OF C O W S.

**M**OST of the grafs in this neighbourhood is applied to the dairy ; every farm, large or finall, has a dairy of cows ; they rife from one to twenty-five. The common notion is, that little grafs is here good enough for fattening, and that bad or middling grafs pays better in milking. In compliance with the general custom, I kept a small dairy ; the minutes of which I fhall infert under this head.

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### S E C T. I.

#### Of their S U M M E R F O O D.

**N**Atural grafs is principally depended on for cows in fummer ; fome farmers feed them with clover ; others are much averfe to it. I have tried them in moft graffes : the following are my experiments.

#### EXPERIMENT, N<sup>o</sup> I.

I find by the proportion of flock to land, that four milch cows in this year, 1763, eat fix acres of grafs in fields A, B, C, and D, from turning out in May to taking into the yard in October.

EXPERIMENT, N<sup>o</sup> 2.

In the summer of 1764, four milch cows eat, in fields A, B, C, and D, seven acres of grafs from turning out to taking in.

EXPERIMENT, N<sup>o</sup> 3.

In the summer of 1765, four milch cows eat, in fields A, B, C, D, eight acres from turning out to taking in.

EXPERIMENT, N<sup>o</sup> 4.

In the summer of 1766, three milch cows eat, in fundry pastures, six acres from turning out to taking in.

EXPERIMENT, N<sup>o</sup> 5.

In the summer of 1767, two milch cows eat, in fundry pastures, three acres from turning out to taking in.

## OBSERVATIONS.

It is of use to know from experiment what the average quantity of land is that a cow eats in the summer; for if a farmer has not this knowledge pretty accurate he cannot judiciously proportion his stock to his land.

	Acres.
Four in 1763 eat	6
— in 1764 eat	7
— in 1765 eat	8
— in 1766 eat	8
— in 1767 eat	6

Average 7 acres;

or 14 acre *per* cow, of land that yielded on an average, at one mowing, 1 ton, 13 cwt. 3 qrs. of hay *per* acre. I apprehend this quantity of grafs might be fixed on at a medium of years; for 1763 was a dry one, and 1765 a drought; 1764, 1766, and 1767, wet ones, which is nearly an equality: but I do not think, from the best observations I have been able to make, that on soils of any richness the season is of much consequence. Wet years bring much more hay, and a greater quantity of grafs for feeding; but in dry ones the grafs is much more nourishing. In 1765, when the pastures were burnt up, it was remarkable to observe how full the cows bags were, when they apparently had nothing to eat; and the superior richness of the milk and cream, in making butter and cheese is undoubted.

## C L O V E R.

EXPERIMENT, N<sup>o</sup> 6.

In 1765, turned two milch cows into a clover field, and confined them to it for a week. The butter tasted.

EXPERIMENT, N<sup>o</sup> 7.

In 1765, confined two milch cows to a small field of grafs, very bare, with admission to an adjoining clover field. I observed them, and found that they fed a good deal on the grafs; not totally on the clover, tho' it was the better bite. The butter had not the least taste.

EXPERIMENT, N<sup>o</sup> 8.

In July 1766, confined three cows to clover alone for a week, made in that time three cheefes, which were marked. After a week intervening confined them in a field where they had clover and grafs on a large border; they fed partly on both. Marked the three cheefes of that week. The ensuing winter they were used: two of the first three cheefes were much inferior to the last three, which were as good as when the cows fed totally on grafs; the two inferior were much hooved, but the third a good one.

## OBSERVATIONS.

From these trials, as well as more general remarks, it is clear that clover is not prejudicial either to butter or cheefe, if the cows be not confined to it. Let them have some natural grafs at the same time, and no ill effect will arise.

EXPERIMENT, N<sup>o</sup> 9.

I found by trial, in the summer of 1766, that a cow would eat an acre and half of clover (from May 12th to the end of September) that was sown with commonly manured turnip-land barley; and left about enough for three months subsistence of a sheep.

## L U C E R N E.

EXPERIMENT, N<sup>o</sup> 10.

May 1765, I find a cow eats of mown lucerne 67 lb. in twenty-four hours.

Another day, - - - - - 64

Ditto, - - - - - 72

L112

Ditto,

Ditto,	-	-	-	-	-	69 lb. in twenty-four hours.
Ditto,	-	-	-	-	-	71
Ditto,	-	-	-	-	-	60
Ditto,	-	-	-	-	-	65
Ditto,	-	-	-	-	-	70

Average 69 lb.

The cows of a middling size will fatten to about 45 or 50 stone (14 lb.)

EXPERIMENT, N<sup>o</sup> 11.

lb.

In July 1766, a cow in twenty-four hours eat of mown lucerne,	-	62
Ditto,	-	65
Ditto,	-	78
Ditto,	-	67
Ditto,	-	59
Ditto,	-	62

Average 65 lb.

EXPERIMENT, N<sup>o</sup> 12.

lb.

In June 1767, a cow eat, in twenty-four hours, of mown lucerne,	-	65
Ditto,	-	67
Ditto,	-	69
Ditto,	-	58
Ditto,	-	65
Ditto,	-	70
Ditto,	-	63

Average 65 lb.

Average of 1765,	-	69
Ditto of 1766,	-	65
Ditto of 1767,	-	65

General average 66 lb.

From hence it appears, that a cow, in six months of summer, would eat 5 tons, 7 cwt. 16 lb. so that any person, inclined to keep his cows on lucerne, may be able to proportion the crop to the designed number of cattle.

EXPERIMENT, N<sup>o</sup> 13.

In July 1765, confined two cows ten days to mown lucerne, in a yard where they had no other food. The milk had no disagreeable taste, nor the cream;

cream ; but the butter, in the judgment of one or two persons, tasted a little. Marked a cheese then made, which turned out quite as good as the rest.

EXPERIMENT, N<sup>o</sup> 14.

In September 1765, confined two milch cows to a small close, and fed them a week with mown lucerne ; they picked up a little grass with it ; but the quantity very trifling : neither the milk, cream, nor butter tasted the least.

EXPERIMENT, N<sup>o</sup> 15.

In May 1766, confined two cows to a yard, and fed them a week totally on lucerne ; the milk, cream, and butter, perfectly sweet.

EXPERIMENT, N<sup>o</sup> 16.

In July 1766, confined two cows to lucerne a week, without other food ; the cream and butter tasted.

EXPERIMENT, N<sup>o</sup> 17.

In August 1766, that I might discover the cause of the preceding variations, I confined four cows, in two divisions, totally to lucerne for a week ; two were fed from the gravelly loam, and two from clayey : the milk, cream, and butter were perfectly alike, the cream rather tasted.

EXPERIMENT, N<sup>o</sup> 18.

Continued the cows of N<sup>o</sup> 17. at lucerne another week ; two were fed with it mown, about a fortnight old, and two with that above a month old, quite in blossom. The cream and milk of the latter tasted ; of the former not in the least.

## OBSERVATIONS.

The former contradictions, which arose from not registering the age of the lucerne when cut, and the clear distinction in the last experiment, shew plainly the state of the case. Lucerne, before it is full grown and in blossom, gives no disagreeable taste to the cream or butter ; but afterwards it affects it. This is an evil easily to be guarded against.

EXPERIMENT, N<sup>o</sup> 19.

Tried several cows at different times in the summers of 1766 and 1767, respecting the quantity of milk from lucerne. I found, from numerous trials, that lucerne bred milk more than clover. But the cows rather declined in quantity

quantity when taken from a good bite of natural grafs. From bad pasture they improved with lucerne.

#### GENERAL OBSERVATIONS.

It appears from these trials that lucerne may be depended on for the regular food of dairy cows, and if so, most certainly for those kept merely for milk or suckling. And as this grafs yields a vast produce, there can be no doubt of the great profit of planting enough of it for the principal summer support of the farmer's cows; for an acre of it will assuredly maintain far more than any natural grafs.

#### SAINFOINE.

##### EXPERIMENT, N<sup>o</sup> 20.

	lb.
In July 1766, a cow eat, in twenty-four hours, of sainfoine mown,	58
Ditto, " " " " " " " " " " " " " " " "	63
Ditto, " " " " " " " " " " " " " " " "	67
Ditto, " " " " " " " " " " " " " " " "	65
Ditto, " " " " " " " " " " " " " " " "	62
Ditto, " " " " " " " " " " " " " " " "	68
Average 64 lb.	

The cow was confined totally to the sainfoine; the milk, cream, and butter, perfectly good.

##### EXPERIMENT, N<sup>o</sup> 21.

In June 1766. confined two cows a week to sainfoine: the milk, cream, and butter, perfectly good. Marked two cheeses then made, which also proved as good as the common ones.

#### BURNET.

##### EXPERIMENT, N<sup>o</sup> 22.

Turned a cow into burnet in July 1766, for ten days; her milk, cream, and butter extremely good; if any thing, better than common.

##### EXPERIMENT, N<sup>o</sup> 23.

Repeated this trial in August 1767; the result exactly the same.

## S E C T. II.

## Of their W I N T E R F O O D.

THE farmers in Suffolk feed their cows on nothing but straw, hay, and turnips, in winter; on straw while they are dry, on hay and turnips before they calve and after, and on hay alone while they make butter from them. I have tried them occasionally with some other sorts of food.

## H A Y.

EXPERIMENT, N<sup>o</sup> 24.

Weighed the hay to two milch cows, in December 1765.

	lb.
They eat in twenty-four hours	72
Ditto, - - - - -	68
Ditto, - - - - -	87
Ditto, - - - - -	86
Ditto, - - - - -	71
Ditto, - - - - -	69
Ditto, - - - - -	71

Average 75 lb. which is *per* cow  $37\frac{1}{2}$  lb.

EXPERIMENT, N<sup>o</sup> 25.

In February 1767, weighed the hay to a milch cow confined.

	lb.
She eat in twenty-four hours	37
Ditto, - - - - -	43
Ditto	



											lb.
Ditto,	-	-	-	-	-	-	-	-	-	-	40
Ditto,	-	-	-	-	-	-	-	-	-	-	44
Ditto,	-	-	-	-	-	-	-	-	-	-	50
Ditto,	-	-	-	-	-	-	-	-	-	-	48
Ditto,	-	-	-	-	-	-	-	-	-	-	41
Ditto,	-	-	-	-	-	-	-	-	-	-	38
Average 42½ lb.											

Average of Experiment N <sup>o</sup> 24,	-	-	-	-	-	-	-	-	lb.
Ditto of this,	-	-	-	-	-	-	-	-	37½
Average of both 40lb.									42½

## OBSERVATIONS.

From these trials we find that if cows are fed on hay alone 40 lb. *per* cow *per* day must be allowed for them, and the farmer must calculate accordingly. But let me observe that there are very few cases in which it is necessary to feed them on hay alone. It should always be remembered that my cows are rather of a small breed; that is, they would fatten from 45 to 50 stone (14 lb.)

## T U R N I P S.

EXPERIMENT, N<sup>o</sup> 26.

In December 1765, put a cow that was near calving into a yard by herself, to feed her better than the common straw keeping. I gave her 50 lb. of turnips every day for a fortnight, besides as much straw as she would eat, to try if that portion of food would better her keeping sufficiently: she looked very well, and had a fine calf, shewing no signs of a want of better keeping. From which I judge, that quantity of turnips would be sufficient to improve the food of cows before their calving.

EXPERIMENT, N<sup>o</sup> 27.

In the winter of 1766 I put a cow to turnips and straw instead of straw alone, three weeks before her calving. I allowed her 50 lb. a day, and she did in all respects as well as others that were baited well at the same time with hay morning and night.

It is apparent from these trials, that turnips may be substituted instead of hay for this purpose, and a great saving made thereby; hay being beyond comparison a dearer food.

EXPERIMENT, N<sup>o</sup> 28.

In the winter of 1766, tried turnips in several variations, to discover in what degree they make butter taste. A cow fed totally on them yielded cream that tasted strong, and the butter was excessively bad.

Fed partly with turnips and partly with hay, half and half; the butter tasted, but not near so rank as the first.

Fed three-fourths with hay and one-fourth with turnips; the butter was good in the opinion of several, but tasted a little in that of others. From hence I conclude, that the very rank turnip butter arises from total feeding on that root, and that partially used the disagreeable effect may be prevented.

## C A R R O T S.

EXPERIMENT, N<sup>o</sup> 29.

In December 1765, fed a cow with carrots, allowing her what straw she liked.

	lb.
She eat in twenty-four hours	97
Ditto,	86
Ditto,	85
Ditto,	76
Ditto,	89
Ditto,	86
Ditto,	70
Ditto.	74
Average 83 lb.	

The milk, cream, and butter, perfectly sweet and good; something better than common.

EXPERIMENT, N<sup>o</sup> 30.

In January 1767, gave a milch cow 50lb. of carrots *per* day, besides some straw; her milk, cream, and butter perfectly good. She gave considerably more milk than when fed totally on hay.

## OBSERVATIONS.

It is not only from these trials, but also from divers other similar ones, that I know the excellence of carrots as a food for milch cows. I have found, by many experiments that they are a very cheap food, yield large quantities of milk, and make excellent butter; as good as ever made from the best

without assistance from hay. I cannot avoid strongly recommending them to all spirited cultivators, who will listen to matters beyond the common road.

## P O T A T O E S.

### EXPERIMENT, N<sup>o</sup> 31.

Confined a cow in December 1766, and gave her 50 lb. of potatoes; she had straw by her. It was three days before she began them; but after having tasted them she began gradually to eat, as if with some appetite, and finished them by night. The next day she had 50 lb. more; and so on for ten days. Her milk, cream, and butter free from taste.

Where potatoes can be raised in large quantities, it is of some consequence to know that cows will eat them, and that the butter will receive no harm; for I apprehend them to be a vastly cheaper food than hay.

## S E C T. III.

## Of their EXPENCES and PRODUCT.

THIS article will not admit of minute accuracy, nor is it of consequence, for a rough sketch, that does not come to the exactness of a shilling, will give a better idea than general reasonings. The accounts of stock are valuable to every man, since it is only by such accounts (and all must be imperfect) that we can form an idea of profit or loss: even the common farmers draw them out on paper in a rough manner if they can write, and if not, in their head as well as they can; so that imperfect relations are acknowledged to be of more use than none at all.

EXPERIMENT, N<sup>o</sup> 32.

Expences and produce of four, 1763.

EXPENCES.					£.	s.	d.
Hay, &c.	-	-	-	-	2	2	6
27 weeks straw at 9d.	-	-	-	-	4	1	0
25 weeks grafs at 1s. 6d.	-	-	-	-	7	10	0
Sundry expences in dairy,	-	-	-	-	0	10	10
					14	4	4
PRODUCE.					£.	s.	d.
Butter at 6d.	-	-	-	-	7	15	0
Milk and cream; the milk $\frac{1}{2}$ d. per pint, the cream 6d.	-	-	-	-	1	9	8
Cheese at 2 $\frac{1}{2}$ d.	-	-	-	-	7	8	6
					16	13	2
Carried over,					Brought		
M m m 2							

	£.	s.	d.
Brought over,	16	13	2
Four calves,	4	5	0
Pigs and their improvement,	4	10	0
	25	8	2
Expences,	14	4	4
Profit, 2 <i>l.</i> 15 <i>s.</i> 11 <i>d.</i> per cow,	11	3	10

EXPERIMENT, N<sup>o</sup> 33.

Expences and produce of four, 1764.

	EXPENCES.	£.	s.	d.
Hay, &c.	-	2	15	0
27 weeks straw,	-	4	1	0
25 ditto grafs,	-	7	10	0
Faggots,	-	1	10	0
Sundries,	-	1	3	10½
		16	19	10½

	PRODUCE.	£.	s.	d.
Butter,	-	8	16	6½
Cheese,	-	7	1	2½
Calves,	-	4	7	0
Milk and cream,	-	2	2	0
Pigs and their improvement,	-	4	15	0
		27	1	9
Expences,	-	16	19	10½
Profit, 2 <i>l.</i> 10 <i>s.</i> 6 <i>d.</i> per cow,	-	10	1	10½

EXPERIMENT, N<sup>o</sup> 34.

Expences and produce of four, 1765.

	EXPENCES.	£.	s.	d.
Hay, &c.	-	2	16	0
27 weeks straw,	-	4	1	0
25 ditto grafs	-	7	10	0
		14	7	0
Carried over,		14	7	0
Brought				

	f.	s.	d.
Brought over,	14	7	0
Faggots,	1	15	0
Sundries,	0	12	0
	16	14	0
<b>PRODUCE.</b>			
Butter,	8	13	0
Cheese,	8	16	0
Milk and cream,	1	12	0
Calves,	4	0	0
Pigs and their improvement,	5	0	0
	28	1	0
Expences,	16	14	0
Profit, 2l. 16s. 9d. per cow,	11	7	0

EXPERIMENT, N<sup>o</sup> 35.

Expences and produce of three, 1766.

	f.	s.	d.
<b>EXPENCES.</b>			
Hay, &c.	3	15	0
27 weeks straw,	3	0	9
25 ditto grafs,	5	12	6
Sundries,	0	8	3
	12	16	6
<b>PRODUCE.</b>			
One let the season for	4	10	0
Butter,	6	15	0
Cheese,	4	1	0
Three calves,	2	15	0
Pigs and their improvement,	3	3	0
	21	4	0
Expences,	12	16	6
Profit, 2l. 15s. 10d. per cow,	8	7	6

EXPERIMENT, N<sup>o</sup> 36.

Expences and produce of five, 1767.

EXPENCES.						£.	s.	d.
Hay, &c.	-	-	-	-	-	2	2	0
27 weeks straw,	-	-	-	-	-	2	0	6
25 ditto grafs,	-	-	-	-	-	3	15	0
Sundries,	-	-	-	-	-	0	5	0
						8	2	6
PRODUCE.						£.	s.	d.
One let at	-	-	-	-	-	4	10	0
Cheefe,	-	-	-	-	-	2	5	11
Butter,	-	-	-	-	-	3	6	0
Calves,	-	-	-	-	-	1	7	0
Pigs and their improvement,	-	-	-	-	-	2	10	0
						13	18	11
Expences,	-	-	-	-	-	8	2	6
Profit, 2l. 18s. 2½d. per cow,	-	-	-	-	-	5	16	5
						£.	s.	d.
Profit per cow, 1763,	-	-	-	-	-	2	15	11
Ditto, 1764,	-	-	-	-	-	2	10	6
Ditto, 1765,	-	-	-	-	-	2	16	9
Ditto, 1766,	-	-	-	-	-	2	15	10
Ditto, 1767,	-	-	-	-	-	2	18	2½
						13	17	2½

Average 2l. 15s. 5d.

## OBSERVATIONS.

There are two circumstances which here particularly require explanation. First, the article *firing*; on which I must remark, that I have charged the real fact, for sometimes it cost nothing; for instance, when I grubbed up the rubbish that over-run the borders under the hedges, the value of the stuff about paying the expences. Now I think a farmer should not charge them to his dairy, because he could not sell them in one situation in twenty, and they are good for but little except heating the copper: this point is not however

however of consequence, for supposing the value greater, yet it is not applicable to many farms; because scarce any tenants are allowed to sell wood they are to cut no more than for their own consumption. Secondly, I must observe, that the keeping in the straw yard is here valued at 9d. a week; not because it is an exact price; but I have no rule to guide me: the price of joisting varies so much, that it can be no guide; and the time includes the cows eating their hay, &c. I have therefore calculated it at a low price. Perhaps this article should not have been charged at all, from the dung the cows raise being more than equal to the straw they eat; however, to obviate objections, I have charged something under what I take to be the average price.

As to the profit of 2*l.* 15*s.* 5*d.* per cow, an imaginary deduction should be made for attendance, which will reduce it something; but I think it remains in one case an adequate amount, in another an inferior one. If the farmer has an opportunity of changing the stock to other sorts, I apprehend some would be more profitable, either in fattening cattle or young stock. But if, from various circumstances, he cannot do that, then a market for his grass, hay, and straw, at good prices, consumed at home in raising dung, with a profit of 1*l.* 11*s.* 11*d.* should by no means be esteemed a trifling object; for he has a double profit, first upon those crops, and then on the cattle that eats them.

### B U T T E R and C H E E S E.

The attentive reader, by comparing the same object in every different view, finds relations or contrasts that are of use; it is for this reason I give the separate products of cows.

#### EXPERIMENT, N<sup>o</sup> 37.

Of four, 1763.

Butter 310*lb.* or 77*lb.* per cow.\* Cheese 706*lb.* or 176*lb.* per cow.

#### EXPERIMENT, N<sup>o</sup> 38.

Of four, 1764.

Butter 327*lb.* or 82*lb.* per cow. Cheese 709*lb.* or 177*lb.* per cow\*.

#### EXPERIMENT, N<sup>o</sup> 39.

Of four, 1765.

Butter 346*lb.* or 86*lb.* per cow\*. Cheese 850*lb.* or 212*lb.* per cow.

\* Some milk and cream otherwise applied, but not a great deal.



EXPERIMENT, N<sup>o</sup> 40.

Of two, 1766.

Butter 270lb. or 135lb. *per cow*.      Cheese 440lb. or 220lb. *per cow*.EXPERIMENT, N<sup>o</sup> 41.

Of one, 1767.

Butter 132lb.      Cheese 215lb.

## OBSERVATIONS.

The encreasing quantity of N<sup>o</sup> 4, and 5, is owing to no milk or cream being otherwise applied, though the quantity yielded by any cow necessarily depends in a good measure upon the time the calves are kept; but I cannot find any minutes how long the above-mentioned ones were kept suckling. The mediums of these quantities are,

							lb.
Butter,	1763,	-	-	-	-	-	77
	1764,	-	-	-	-	-	82
	1765,	-	-	-	-	-	86
	1766,	-	-	-	-	-	135
	1767,	-	-	-	-	-	132
Medium 102lb. <i>per cow</i> .							
							lb.
Cheese,	1763,	-	-	-	-	-	176
	1764,	-	-	-	-	-	177
	1765,	-	-	-	-	-	212
	1766,	-	-	-	-	-	220
	1767,	-	-	-	-	-	215
Medium 200lb. <i>per cow</i> .							

I can by no means assert the great importance of these affairs; but they are not for that reason to be despised, or even neglected. Whatever tends to reduce the uncertainties of husbandry to matters of calculation is of use; because it would be of great advantage to be able from abundance of experiments to determine the proportion between the value *per acre* of the land, and the number of pounds of butter and cheese to be expected from a cow fed on it; it is desirable merely to know the general average of cows. I am sensible of the multiplicity of circumstances which cause variations; but in all these enquiries, the more we form experiments, the less become the variations, until certainty is at last arrived at.

	S	W	I	N	E	£	s.	d.
Product <i>per</i> cow in 1763,	-	-	-	-	-	1	2	6
Ditto in 1764,	-	-	-	-	-	1	3	9
Ditto in 1765,	-	-	-	-	-	1	5	0
Ditto in 1766,	-	-	-	-	-	1	1	0
Ditto in 1767,	-	-	-	-	-	1	5	0
Average <i>il.</i> 3 <i>s.</i> 5 <i>d.</i>								

Upon this I should remark, that the management I always pursued, was to preserve the dairy wash in brick cisterns, into which it ran, against the sows pigged, for them and their pigs, until they were able to subsist without such assistance. This conduct is absolutely necessary, if much profit is even thought of from swine; for that food which will support sows with pig, and wean young pigs, should never be given to hogs: to be obliged to do this for want of proper conveniences should never be submitted to.

But the sums before charged are calculated distinct from some other help from grains, &c. and from reflecting on the matter further, I think I have not allowed so much to the dairy as I ought; but I let it pass, that no exaggeration may be thought.

## C H A P. II.

## Of O X E N.

**M**Y experience in grazing was but beginning when I left the farm; had I continued longer on it I should have extended this part of my business; I shall at present only insert a few observations, and trials that occurred in the course of fattening some beasts in summer, and also in winter alone. I include under the title Oxen, all fattening beasts.

EXPERIMENT, N<sup>o</sup> 1.

In August 1765, a small fattening steer was taken from pasture and confined to mown lucerne; the first week she fell off in her looks, but recovered them fully the second, in the opinion of two farmers; but others thought she suffered.

EXPERIMENT, N<sup>o</sup> 2.

In July 1766, a fattening cow was put to mown lucerne; she was kept to it three weeks; she did not appear to fall off, from this change of food.

EXPERIMENT, N<sup>o</sup> 3.

In June, &c. 1766, two fattening oxen and a cow were at different times changed from their pastures to a clover. It was supposed that they would presently shew their dislike at the change which I thought did happen; but my bailiff was of a different opinion, he said they liked the change, but it should be only for a short time.

EXPERIMENT, N<sup>o</sup> 4.

In May 1767, took a fattening cow from hay, &c. to mown lucerne; she came on in her looks visibly, and two farmers thought she would fatten well on

on it. She held to her appearance, improving a month, but it did not suit me to continue her.

## W I N T E R F A T T E N I N G.

### EXPERIMENT, N<sup>o</sup> 5.

In January 1765, two small Scotch black cattle had their turnips regularly weighed to them every day for a fortnight.

	lb.
They eat the 1st day,	200
2d,	190
3d,	192
4th,	183
5th,	187
6th,	200
7th,	191
8th,	190
9th,	199
10th,	185
11th,	190
12th,	195
13th,	187
14th,	201

Average 192 lb. or 96 lb. each.

When fat they weighed about 34 stone each ; so that they eat about a fifth of their own weight when fat every day.

### EXPERIMENT, N<sup>o</sup> 6.

In February 1765, weighed the turnips for a month ; eat by two cows fattening, which when fat weighed 35 stone each. They had a portion of hay every day given them.

	lb.
The 1st week they eat	2500
2d,	2420
3d,	1700
4th,	1998

Average 2154 lb. or 1077 lb. *per* cow, which is 154 lb. *per diem*.

The cow weighed 35 stone fat; they therefore eat at the rate of not quite one third of their own weight when fat every day, besides some hay.

### EXPERIMENT, N<sup>o</sup> 7.

In January 1765, gave the two cows of N<sup>o</sup> 6. carrots for a few days to compare them with turnips. From the first bite they shewed a manifest preference for the carrots, and after the first day would not touch a turnip while a carrot was in the manger. I buried some carrots under a parcel of turnips, and they turned away all the latter, and seized the carrots; weighed them for ten days.

	lb.
They eat the 1st day	150
2d,	152
3d,	165
4th,	182
5th,	179
6th,	190
7th,	188
8th,	175
9th,	165
10th,	170

Average 171 lb. or 85 lb. *per cow.*

It appears evidently from hence that carrots are a much more substantial food than turnips; for the cattle preferring them, and yet eating much less, shews plainly that they are far from more nourishing: to which must be added the great superiority of the beasts fattening faster on them than on turnips, which would certainly render them far more profitable.

### EXPERIMENT, N<sup>o</sup> 8.

In November 1765, bought in two home-bred heifers for fattening; they cost 10*l.* and were as equal in all respects as possible. One of them I put to hay and turnips, and the other to various sorts of food, to try the effect of changing often. I kept them 14 weeks, and then sold them; that fattened on turnips and hay sold for 7*l.* 1*s.* the other for 8*l.* 10*s.*

	£.	s.	d.
The first eat 6 cwt. of hay, at 2 <i>s.</i> 6 <i>d.</i>	0	15	0
6 tons, 11 cwt. of turnips; suppose they cost 3 <i>s.</i> a ton,	0	19	6
	1	14	6

Profit, 6*s.* 6*d.*

The

	£.	s.	d.
The other eat 4 cwt. of hay,	0	10	0
2 tons of turnips,	0	6	0
12 bushels of carrots: suppose 4d. a bushel,	0	13	0
40 bushels of cut chaff, at 2s.	0	6	8
4 bushels of barley meal, at 2s. 6d.	0	10	0
15 bushels of bran, at 6d.	0	7	6
	<hr/>		
	2	13	2
	<hr/>		

Profit, 16s. 10d.

This comparison suggests a very important lesson. It is evidently more than twice as profitable to fatten a beast with various sorts of food than with only two sorts. The difference of 6s. 6d. and 16s. 10d. in any article that is returned in less than four months is very great, and proves the necessity of duly attending to this point in all fattening beasts. I observed that the heifer fed with a change would often eat of a fresh sort of food when she quite refused that she had had last. This management carried her forward very quick, insomuch that she was in very fair order for killing in eleven weeks from being put up lean; an expedition which I never knew in beasts that had only two sorts of food. The importance of gaining so much time is very great, for all the sorts go so much farther, and raise a proportionably greater profit; besides the benefit, not inferior to any other, of raising much larger quantities of dung than in the common method. Upon the whole, I cannot but earnestly recommend this attention to all farmers who make the winter fattening of beasts a part of their business: they will most assuredly find it far more profitable to give a change of food than confine their cattle to one or two sorts; and the greater variety they have, certainly the better.

#### EXPERIMENT, N<sup>o</sup> 9.

In January 1767, weighed the turnips to two stall-fed steers of the home breed, which when fat weighed about 34 stone. They had a small quantity of hay every day.

	lb.
They eat, the 1st,	240
2d,	226
3d,	238
4th,	228
5th,	236
6th,	252
	7th,

lb.

7th,	-	-	-	-	-	-	-	-	245
8th,	-	-	-	-	-	-	-	-	244

Average 238 lb. or 119 lb. *per* beast, which is a fourth of their own weight when fat.

EXPERIMENT, N<sup>o</sup> 10.

October 27th, 1766, put up two large oxen of about 75 stone, that had been fattening at grafs, to turnips and hay : they had good hay constantly in their rack ; the turnips sliced into their manger and measured to them the whole time of fattening, in a bushel basket. Each basket full weighed, on several trials, at a medium 58 lb. They eat as follows.

	busshels.	lb.
1st week	52	3016
2d,	64	3712
3d,	68	3944
4th,	73	4234
5th,	77	4466
6th,	78	4524
7th,	77	4466
8th,	77	4466
9th,	82	4756
10th,	79	4582
11th,	78	4524
12th,	78	4524
13th,	57	3306
and 32 busshels of chaff.		
14th,	75	4350
and 28 busshels of chaff.		
15th,	82	4756
and 28 busshels of chaff.		

1097

63,626

Total, 28 tons, 8 cwt. or 14 tons, 4 cwt. each ox.

Medium *per* week, 1 ton, 18 cwt. or 19 cwt. *per* ox

## OBSERVATIONS.

It is to be remarked, that for six weeks after the first stalling they increased in the quantity they eat regularly, and from thence continued pretty equal till the chaff was given them, which for one week reduced the quantity of turnips greatly ;



greatly ; owing, I apprehend to the novelty of it, for the next they rose again considerably, and the next to that gained their largest quantity. Their hay was not weighed to them, but I attended constantly to the filling of their rack, and remarked particularly that it never varied, not even when the chaff was given them. This plainly shews that the way to get beasts speedily fat is to change their food often, which will make them eat in quantity more than without such management ; and it is a fact clear enough, that the more a beast eats the better he will fatten. According to my crop of turnips this year, they eat about an acre each.

These oxen eat above a fourth of their own weight every day in turnips alone.

### EXPERIMENT, N<sup>o</sup> 11.

December 24th, 1766, stalled a cow of about 32 stone, lean from straw in the same house with the oxen of N<sup>o</sup> 2. Her turnips were regularly measured to her like theirs, and she had hay constantly in her rack.

	busshels.	lb.
She eat the 1st week,	22	1276
2d,	22	1276
3d,	18	1044
4th,	15	870
5th,	13	754
6th,	28	1624
7th,	27	1566
8th,	28	1624
9th,	28	1624
10th,	28	1624
	<hr/> 229	<hr/> 13,282

Total, 5 tons, 18 cwt.

Medium, 12 cwt. per week.

### OBSERVATIONS.

The falling off of this cow the 3d, 4th, and 5th weeks is not to be accounted for ; but I should observe she was not in appearance a kindly fattening one ; her looks did her no credit ; and I afterwards found her at grass a very slow thriving one. She eat in these ten weeks about the third of an acre.

She eat of turnips alone above a third of her own weight every day.



EXPERIMENT, N<sup>o</sup> 12.

February 5th, 1767, stalled two large oxen, of the size of Experiment N<sup>o</sup> 2, at turnips and hay, in the same fattening house as the preceding ones; measured their turnips in the same manner.

	busshel.	lb.
They eat the 1st week,	70	4582
2d,	80	4640
3d,	87	5046
4th,	96	5568
	<u>342</u>	<u>19,836</u>

Total, 8 ton, 17 cwt.

Medium, 2 tons, 4 cwt. *per week*; or 1 ton, 2 cwt. *per ox*.

## OBSERVATIONS.

As these oxen were as nearly of the size of the former two as could be, the superior quantity they eat can only be attributed to their being put up directly from the plough to begin their fattening, whereas the former pair had been fattening upon the summer's grass, which one might have expected would make a difference. They eat a third of their weight every day in turnips.

## OBSERVATIONS.

The small black cattle in Experiment N<sup>o</sup> 5, eat every day, of turnips, one-fifth of their own weight.

Cows, in Experiment N<sup>o</sup> 6, one-third.

Home-bred steers, Experiment N<sup>o</sup> 9, one-fourth.

Large oxen, in Experiment N<sup>o</sup> 10, one-fourth.

A cow in Experiment N<sup>o</sup> 11, one-third.

Large oxen in Experiment N<sup>o</sup> 12, one-third.

The average is between a third and fourth. Hence we find that in proportioning the turnip-crop to the beasts for fattening, we should have turnips enough for this allowance; and as to the time of fattening, I may remark that I have found beasts of from 30 to 50 stone will fatten, with good management, in three months, if their food is changed; or four months on turnips and hay alone. These points should be accurately known by all who make the fattening of beasts a part of their business. I should insert a greater number of experiments under these heads, but my papers grow so voluminous that I am fearful of being tedious.

## C H A P. III.

## Of S H E E P.

**T**HIS animal, which is of such immense consequence to the farmer, can be treated of in full extent only by an acute and attentive experimenter, who has the command of a large space of various ground, that enables him to keep different sorts, and to give each fair play. It is a subject so fertile in useful knowledge, that I am very much surprized so few writers of reputation have undertaken to treat of it from real experience. Volumes have been published about sheep, but they abound with eternal transcripts from each other; and are stuffed with receipts and nostrums for the cure of disorders: the simple register of experience, which is much the easiest method of writing, is never adhered to; one would apprehend from a total want of experience. I feel my own insufficiency strongly here; I can only insert a few minutes which I made for the future conduct of my flocks: the trials are few, but I think they will be useful to me, and consequently may be so to others. I should premise that I never kept a regular flock of flock sheep, but bought and sold annually, fattening them within the year.

## S E C T. I.

## Of their S U M M E R F O O D.

**T**H E principal articles of food depended on in this neighbourhood for the subsistence of sheep in summer, are the natural pastures and clover: it is a doubt here which suits them best; some farmers preferring one, and some the other.

EXPERIMENT, N<sup>o</sup> 1.

In the summer of 1763 turned my sheep (young ewes and lambs) into clover in May, and kept them in it through that month and part of June: from thence took them to the pastures to follow the cows, &c. My bailiff told me they would fall off their looks at first from this change, because they preferred clover after they had been a little used to it. I observed them narrowly, but marked no such appearance as he mentioned; but they had a good bite: I apprehend it is a mistaken notion.

EXPERIMENT, N<sup>o</sup> 2.

In the spring of 1763, turned the ewes and lambs into the clover, with a broad grass border on one side of the field, which gave an opportunity of seeing which they preferred, the natural or artificial grass. They began with the former, and pared it quite down before they took heartily to the clover. From hence there is reason to think that natural pastures are more agreeable to them than artificial ones.

EXPERIMENT, N<sup>o</sup> 3.

In July 1763, turned the sheep from the pastures to the clover; I expected to see them decline in their looks, but it did not happen: they soon fed  
verm.

very heartily on it, and from the event I am clear that both of these sorts of food may be used for fattening sheep, either alone or interchangeably, without any danger of their declining: indeed the general idea of change of pasture agrees well with this result.

EXPERIMENT, N<sup>o</sup> 4.

At different times throughout the summer of 1764, turned my sheep (old ewes and lambs, called in Suffolk *crones*) from the pastures to the clover, and from the clover to the pastures; and observed carefully if any alteration was to be found in their looks; but I never perceived that one sort did better with them than another.

EXPERIMENT, N<sup>o</sup> 5.

In 1765 I tried the changes of clover and natural pastures for my crones and lambs; and found that both sorts were equally to be depended on for the fattening them.

EXPERIMENT, N<sup>o</sup> 6.

In June 1765, tried 20 sheep, old ewes, with lucerne, in a small close of two acres; they had eat it quite down, I then gave them lucerne, mown fresh every day, in their hay crib, and in a small heap or two on the grafs: they took to it at once, and fed very heartily on it for ten days, gleaning every sprig of it up if fresh was not directly brought them; they did not in the least decline in their looks, but would evidently have fattened well on it, had it suited my conveniency to have spared enough.

EXPERIMENT, N<sup>o</sup> 7.

In the summer of 1766, tried at several times ewes and lambs with lucerne mown fresh every day; the result was constantly favourable, and convinced me, that such management may absolutely be depended on for keeping and fattening sheep.

EXPERIMENT, N<sup>o</sup> 8.

In July 1766, compared natural grafs, clover, lucerne, sainfoine, and burnet, all mown; made three heaps of each in a small close fed pasture, and turned twenty ewes into it. They shewed a manifest preference of the lucerne and sainfoine: the clover and natural grafs appeared pretty equal, but they did not touch the burnet till all besides were done, they then eat it up:

EXPERIMENT, N<sup>o</sup> 9.

Throughout the summer of 1767 I tried various times, sheep of different sorts, with the natural and artificial grasses; by turning them from one into another, and attentively observing their motions and their looks, the results of my trials was very favourable to all except burnet; and to that grass also when confined to it, but in a field of various sorts they preferred all the rest; but separately taken, I do not think there is exception to be made against any of them, they may all be depended on for an excellent food: I have no doubt but burnet, which they seem to like the least, would fatten them. As to lucerne, sainfoine, clover, &c. they are as fond of them, after beginning to eat them, as of natural grasses.

## OBSERVATIONS.

One useful conclusion may be drawn from these and many other similar trials I made with sheep. It is, that the farmer has only to gain a plenty of grass, and his sheep will fare well; no matter what it is. I have heard many common opinions that have been extremely different; one tract of country preferring one grass, another preferring a different sort; but it is here extremely plain that you may take lucerne, sainfoine, or clover, as your absolute dependencies for feeding or fattening sheep, when it suits you better than to give them your natural pastures: burnet also will keep them well, and probably will fatten them. On the contrary it is plain, that artificial grasses are by no means necessary for sheep; if it is more convenient to let them have the natural ones, they evidently answer as well.

All changes from one to the other agree well with them. Lucerne may be given fresh mown in racks, and depended on for any sheep.

## S E C T. II.

## Of their WINTER FOOD.

**I**N this part of Suffolk the sheep live in winter on what they can pick up in the fields, if they are lean stock, with some assistance from hay and turnips.

EXPERIMENT, N<sup>o</sup> 1.

In the winter of 1763-4 I made use of turnips for my sheep at lambing time, but my crop being small I was forced to make them go as far as I was able; and by attending to the consumption I found that sheep may be wintered with 10 cwt. of turnips *per* head, with some assistance, in wet weather and snow, from hay: it is to be observed, that the principal dependence is on the pastures, and what they pick up about the farm; turnips need not be given them till a fortnight or three weeks before lambing; and also that I suppose the winter over when the turnips are done, that is the end of March. Now it should not be understood that 10 cwt. of turnips are an ample allowance; but I find that sheep may be kept so without any ill consequence arising: those which I wintered turned out profitably: no lambs were lost, and they all did well. But I shall in future make a greater allowance.

EXPERIMENT, N<sup>o</sup> 2.

In the winter of 1764-5, I wintered 20 sheep and 18 lambs on 17 tons of turnips, which is 17 cwt. *per* head: they lasted till the end of March; the sheep had the range of the farm \* till the end of January. In very wet weather and in snow they had hay in a covered rack on wheels. The result proved to me that this allowance of turnips was sufficient; and may be de-

\* The stubbles are always ploughed up in autumn.

pended on in proportion for any stock of sheep, provided the farm be not overstocked. Winter range depends on the quantity of after-grass left; but feed it down as close as possible with great cattle, 5 acres a head, 2½ grass, and 2½ arable, with grass borders around it, will be sufficient.

#### EXPERIMENT, N<sup>o</sup> 3.

In the winter of 1765-6, my ewes and lambs were a little distressed for feed, owing to so many turnip crops failing; 90 and their lambs had about 43 tons; which proved, from the sheep not doing well, to be an insufficient allowance.

#### EXPERIMENT, N<sup>o</sup> 4.

Thirty-six tons of turnips (one acre) maintained, in February 1767, 40 sheep three weeks, fed on the land: but let me observe this feeding was the same as for fat sheep, as much constantly as they would eat.

#### EXPERIMENT, N<sup>o</sup> 5.

In January 1767, twenty tons of turnips drawn and laid on a grass field, maintained 40 sheep a month, by baiting them six hours in the middle of the day.

#### EXPERIMENT, N<sup>o</sup> 6.

In January 1766, weighed the hay eat by 20 sheep and their lambs in a week, the amount 12 lb. they had very little food besides.

#### OBSERVATIONS.

From these trials may perhaps be gained a clearer knowledge of the necessity of providing a due portion of winter food for sheep, than from general ideas. It is ever of consequence to know what portion of a given food is requisite for any number of cattle. In fattening of sheep, wherein they have constantly as much as they can eat, the case is easy to determine from a few experiments; but it is different with stock sheep, kept lean through winter to be fattened the summer following. It is a common opinion here (whether true or not I never experimentally tried) that ewes should not be well fed while they are with lamb; and the reason given is, the lambs within them growing so much that many are lost in eaning (bringing forth). It is evident however, that but indifferent food will suffice for them till they lamb. Suppose we state the food to the end of March, at the range of 6 acres *per* head, half grass and half arable\*; hay in very heavy rains and in

\* If the land is ploughed they will not go on it, unless full of weeds.

snows, with a ton of turnips each; I am well assured that such an allowance will be found an ample one, and that something less will do. If the sheep can have no range, then the hay and turnips certainly must be proportioned. This winter feeding sheep before their lambing shews plainly the farmers reason for not ploughing up their stubbles in autumn: a weedy stubble will certainly much assist in winter keeping the flock, perhaps to the amount of some shillings an acre for wheat stubbles; which value, added to the expence of an extra ploughing, may be supposed an object to a common farmer.



## S E C T. III.

## Of their S P R I N G F O O D.

**T**HE winter I supposed in the preceding section to last as long as the turnip season on an average, which is to the end of March; some crops may accidentally last longer, but not many; after that time the roots grow sticky, and they run away for feed, when they draw the ground very much. Good farmers should certainly depend on them no longer than that month, and consequently ought to have other provision to last through the spring, which (with sheep) I call April, and the first fortnight of May. If such provision be not made, the sheep will suffer greatly; the farmer in a vast consumption of hay, or the grass crops half ruined by being fed at an improper season.

EXPERIMENT, N<sup>o</sup> 1.

In October 1763, sowed four acres of gravelly loam with rye; the piece was designed for turnips; my bailiff advised this husbandry, and said it was common: in April following it was of some assistance in feeding my couples; but by the confession of the man himself, not to near the amount of its cost. The rye feed came to 22s. besides the ploughing, harrowing, sowing, &c. But his argument was, that we could get nothing else, and that the value of the feed was according to the pinch of the season. The sheep were turned in at different times about two weeks and an half in all.

EXPERIMENT, N<sup>o</sup> 2.

In October 1765, sowed six acres with rye, and fed it off the April following: it maintained 90 couples ten days; so insufficient a product, that I determined never more have any dependence on it.

## OBSERVATIONS.

These trials, united with the remarks I have made on the practice of some of my neighbours, I think fully justify my idea of the unprofitableness of this management: rye is gone almost as soon as you turn in, there is no heart in it. A farmer in an adjoining parish sold five acres of rye for spring feed for five pounds; and the man who bought it assured me himself that his sheep eat it at the rate of 10*d.* *per* head *per* week. The dependence of the good husbandman therefore must be on something else. As to hay, there is a great objection to it, besides the expence: ewes at this time of the year should have plenty of food that will breed milk, for the growth of the lambs depends absolutely on the ewe's feed in spring; but hay answers in this respect very poorly.

EXPERIMENT, N<sup>o</sup> 3.

In the year 1766 planted an acre of turnip cabbages for sheep feed; the weight they came to was 22 tons. April 5th, began them for 80 sheep and their lambs; and they lasted till the 10th of May, paying 9*s.* *per* ton for the crop. This plant proved therefore of the utmost importance; for it answered perfectly the great want of food at this season, and in a most profitable manner; the period in which they were consumed being by much the most difficult to provide for in the whole year.

EXPERIMENT, N<sup>o</sup> 4.

The same spring as the preceding trial, another crop of turnip cabbage paid by sheep 10*s.* a ton, another 8*s.* 6*d.* a ton, and the crops amounted so high as 28 tons *per* acre. By particular observations I found that they would last in great perfection to the middle of May, and never required cutting before April.

## OBSERVATIONS.

The turnip cabbage here appears to be a most excellent spring food for sheep; and to answer that great and urgent demand made by so many farmers in this age. I have found, from remarking the progress and expence of the crops, that they are not affected by frosts;—that they are later in running for seed than turnips;—that after they are run, the turnip is not at all sticky, but quite sweet, and freely eat by the sheep, which is very different from turnips;—that they last in good perfection to the middle of May;—that eating them by sheep at 6*d.* a week, they pay near 9*s.* a ton;—and that an acre will produce from 5 to 28 tons. These circumstances

united prove that this plant may be depended on most profitably for spring food of sheep.

#### EXPERIMENT, N<sup>o</sup> 5.

In the springs of 1764, 1765, 1766, and 1767, I attended particularly the first growth of my lucerne fields, with an eye to ascertaining how far it could depend on it for sheep feed. My wanting particularly to know the weight of each cutting of the lucerne, prevented my feeding it; but the growth of the plants in spring shewed its earliness as well as if I had. Several of my crops were cut, a full produce, 18 inches and 2 feet high, the last week in April;—none later than the middle of May: the beginning of April it has often been from 5 to 10 inches high. In a word, the growth has convinced me, that any farmer may on an average of seasons depend on a fine bite for sheep the first week in that month; this is a very important object, and the application of the crop to this use will most certainly pay better than any other. But one circumstance is to be observed; several writers on husbandry caution us against letting the bulbs of the roots be eaten by sheep; I have not tried it, but the only caution requisite is to keep the sheep in the field no longer than the branches of the plants last; for no cattle will bite the bulbs while they can have the leaves.

#### EXPERIMENT, N<sup>o</sup> 6.

March 22d, 1766, I viewed some burnet, and found it 6 inches high, turned sheep in then, and it paid at 6d. a week 16s. an acre; turned in again the 8th of May, and it paid 8s. an acre more.—April 2d, 1767, began to feed it with sheep, and it paid 1l. 8s. an acre.—April 27th, 1767, began to feed another crop, which paid 1l. *per* acre.

From these trials it appears that burnet, left of good height in autumn, may be depended on for profitable sheep feed the latter end of April, and the beginning of May.

#### GENERAL OBSERVATIONS.

I have mentioned nothing of hay as a spring food for sheep, because the great object at present in husbandry is to do without it, both from the expence, and its little merit in breeding milk in ewes. But it appears from the preceding trials, that there are several plants which will answer most profitably at this critical season. These are particularly the turnip, cabbage, lucerne, and burnet. Every farmer, I apprehend, who would apply his crops to the greatest profit, would have a field every year cropped with turnip cabbages, large enough, if he has no lucerne or burnet, to take

his flock the end of March, and keep them till the middle of May: this management will undoubtedly answer if he has fields of lucerne or burnet: his turnip cabbage crop should be only large enough for a month's keeping, and so the last fortnight's dependence to be on grasses; the great advantage of which conduct is the quantity of food yielded *per* acre by them, which will much exceed that of any other grasses at that season. Upon such a plan, I am confident any man may provide amply for his sheep in the spring, and at so low an expence, that the profit will be extremely great.

## S E C T. IV.

## G E N E R A L P R O F I T.

UNDER this head I have it only in my power to state the few trials I have made; had I continued longer on the farm, there would have been a greater variety in them. My flocks of sheep were the smaller from my joisting many.

EXPERIMENT, N<sup>o</sup> 1.

Expences and produce of twenty-five old ewes (or crones) and twenty-four lambs, 1763.

Bought in May 1763. Their pasture consisted of grafs, after mowing, and clover, which they fed with my other cattle. They were all drawn by the butcher before the 5th of November.

EXPENCES.				£.	s.	d.
Cost of them,	-	-	-	12	2	0
Expences,	-	-	-	0	3	0
				12	5	0
PRODUCE.				£.	s.	d.
June. Their wool,	-	-	-	0	17	2
Nov. Sold them for	-	-	-	18	9	0
				19	6	2
				12	5	0
				7	1	2
				OBSER-		

## OBSERVATIONS.

The common and best time to purchase sheep for stock is autumn, to keep them on the poorest pastures in the winter, and on turnips in the spring; but as I took my farm at Lady-day, I was necessarily obliged to buy those which had been wintered at an advanced price; and notwithstanding this disadvantage the profit is not trivial.

EXPERIMENT, N<sup>o</sup> 2.

Expences and produce of twenty, 1764.

Bought the 5th of November 1763. Were fed in the summer, partly upon clover, and partly natural grass.

EXPENCES.							£.	s.	d.
Cost,	-	-	-	-	-	-	4	10	0
Expences,	-	-	-	-	-	-	0	2	0
Shearing,	-	-	-	-	-	-	0	1	0
							<hr/>		
							4	13	0
PRODUCE.							£.	s.	d.
Wool,	-	-	-	-	-	-	1	2	6
Sold them (20 sheep, and 18 lambs) for.	-	-	-	-	-	-	16	0	0
							<hr/>		
							17	2	6
							<hr/>		
							4	13	0
							<hr/>		
Profit.	-	-	-	-	-	-	12	9	6
							<hr/>		

## OBSERVATIONS.

I was reckoned to have very good success with my sheep to raise 18 lambs out of twenty, and if the numerous accidents to which they are liable be considered, I have certainly reason to be satisfied. I consider my profit this year as much as can ever be expected on 20 crones. When turnips are gone in the spring, and before the clover is ready, we are greatly at a loss for feed; to remedy this, I sowed some rye, and found it answered the purpose pretty well. An artificial grass, which comes in the beginning of April, would be an invaluable treasure.

EXPERIMENT, N<sup>o</sup> 3.

Expences and produce of twenty, 1765.

Bought in November 1764. Had turnips in the depth of the winter, and at lambing time; fed in summer on clover and my pastures.

EXPENCES.						£.	s.	d.
Cost and expences,	-	-	-	-	-	5	19	4
Shearing,	-	-	-	-	-	0	1	0
						6	0	4
PRODUCE.						£.	s.	d.
Wool,	-	-	-	-	-	0	16	7
Sold them (20 sheep and 17 lambs) for	-	-	-	-	-	14	5	0
						15	1	7
Expences,	-	-	-	-	-	6	0	4
Profit,	-	-	-	-	-	9	1	3

## OBSERVATIONS.

I had very good luck with the lambs again; 17 out of 20 will pay extremely well in any flock; but the reason of the profit being so much lower this year than the last, is plainly the dearness of the first cost.

EXPERIMENT, N<sup>o</sup> 4.

Expences and produce of ninety-one, 1766.

Bought in November 1765. In the winter they had a piece of rye; but my turnips failing, I was perplexed to find food. They eat up a large quantity of hay, without appearing much the better for it: this bad keeping in the winter made it doubtful with me whether some of them were rotten or not; several died in the spring.

EXPENCES.						£.	s.	d.
Cost at 5s. 4d.	-	-	-	-	-	24	18	6
Expences in buying and driving,	-	-	-	-	-	0	12	6
2 ton of hay,	-	-	-	-	-	5	0	0
Shearing,	-	-	-	-	-	0	6	0
						30	17	0
PRODUCE.								

	PRODUCE.				£.	s.	d.
Sold them (70 sheep and 68 lambs) for	-	-	-	-	50	10	0
Wool,	-	-	-	-	3	0	0
					<hr/>		
					53	10	0
Expences,	-	-	-	-	33	17	0
					<hr/>		
Profit, <i>5l. per score</i> ,	-	-	-	-	22	13	0
					<hr/>		

## OBSERVATIONS.

The losses of this year among them, at the same time that the expence of hay at a high price happened, reduced the profit greatly; it is a vast falling off, from 12*l.* and 9*l.* to 5*l.* and yet considering the hay, and its price, and the loss of 21 sheep, it is amazing any profit at all should remain, and proves the most profitable nature of sheep in the strongest manner.



## C H A P. IV.

## OF D R A U G H T C A T T L E

A Farmer's team of horses is one of the most important articles of his business, unless his land be all grass, and heavier in the expence than most others. The management of it is extremely complex, and admits a multitude of variations ; inasmuch that a young beginner, who would wish to act in the most sensible manner, without any regard to prejudice or old custom, cannot but find himself much at a loss in many particulars of this branch. The books of husbandry treat largely of their shape, disorders, and cures, and an hundred other matters not worth a groat a dozen ; but what we want to have resolved is the difference between horses and oxen ; the cheapest method of feeding horses, the expences, &c. It is totally beyond my power to clear up all these circumstances to the reader ; but the following trials have a tendency to throw some light on them.

## S E C T. I.

## Of their SUMMER FOOD.

AS to the summer food of horses, I have used only three sorts of grass; 1. Natural; 2, Clover; 3, Lucerne. It is needless to state the particulars of feeding them in my pastures and clover fields; and the last, which is much the best food, is set forth in my experiments on lucerne, where I have stated the qualities of each crop that lasted horses a given time; I shall here therefore only observe, that this grass is, of all other articles, that which the farmer should not depend for keeping his horses in summer; It will go farther, keep them better, and infinitely cheaper than any other Food. I have also found by experience, that they do there work on it, without the least assistance of any other food, much better than on grass, clover, or any other pasture; and what is of very great consequence to the farm in general, the quantity of dung raised throughout the summer by this method is very considerable, so that by procuring plenty of latter the horses may be made to pay a good part of the expence of keeping.

It may be proper here to observe, that I have never allowed any dry meat to my team in summer, from turning out to grass or clover; or beginning lucerne in the stable, to the finishing of green food, about the end of October; my horses have nevertheless been constantly worked, and supported their work well. I first began on this plan from my bailiff telling me it was common among the farmers; and by experience I have found dry meat needless, if the horses are otherwise well fed.

## S E C T. II.

## Of their W I N T E R F O O D.

## H A Y.

EXPERIMENT, N<sup>o</sup> 1.

Quantity eat by six, in the winter 1763-4-

**T**HEY were taken into the stable October 20th, and fed with straw to 20th of February; from thence to the 20th of May, three months, they eat of hay

10 tons, 17 cwt.	-	-	£21. 7s.
1 ton, 16 cwt. <i>per horse.</i>		3 cwt. <i>per horse per week.</i>	

EXPERIMENT, N<sup>o</sup> 2.

Quantity eat by seven, in winter 1764-5.

Took into stable October 30th, kept at straw till March 1st; from then till May 7th, nine weeks, they eat

7 tons, 15 cwt. of hay,	-	-	£13. 19s.
1 ton, 2 cwt. <i>per horse.</i>		Near 2½ cwt. <i>per horse per week.</i>	

EXPERIMENT, N<sup>o</sup> 3.

Quantity eat by eight, in winter 1765-6.

Took in October 29th, at straw till the 12th of February; from that time till the 8th of May, or three months, they eat of hay

13 tons,	} 15 at 50s.	-	-	£37. 10s.
2 ditto tares,				
1 ton, 5 cwt. <i>per week.</i>		3 cwt. <i>per horse per week.</i>		

EXPERI-

EXPERIMENT, N<sup>o</sup> 4.

Quantity eat by six, in the winter 1766-7.

Took in November 24th; at straw till the 20th of December; from thence till the 23d of May, at tares twenty-one weeks and a half. They eat

12 tons, 7 cwt. at 45s.      -      -      £27. 15s. 6d.  
2 ton, 1 cwt. *per horse.*      2 cwt. *per horse per week.*

EXPERIMENT, N<sup>o</sup> 5.

Quantity eat by ten, in winter 1767-8.

From the beginning of November to the middle of April, they eat

13 tons,      -      -      £17.  
1 ton, 6 cwt. *per horse.*      1 cwt. 9 lb. *per horse per week.*

## OBSERVATIONS.

The quantities eat <i>per horse per week</i> vary very much.							Cwt.	qrs.	lb.
In 1763,	-	-	-	-	-	-	3	0	0
1764,	-	-	-	-	-	-	2	2	0
1765,	-	-	-	-	-	-	3	0	0
1766,	-	-	-	-	-	-	2	0	0
1767,	-	-	-	-	-	-	1	0	9

Average, 2 cwt. 1qr. 7lb.

Such quantities must necessarily depend a good deal on the other food of the horses, and on the goodness of the hay; but as the matter admits not of a general rule from a few trials, it is to be wished that farming gentlemen would register the particulars of their stables accurately, that from numerous data a general average may be drawn.

## O A T S.

EXPERIMENT, N<sup>o</sup> 6.

Quantity eat by six, in winter 1763-4.

My horses eat no corn in summer, and thrive better without it than with it in winter; indeed their work is lighter.

20 qrs. 7 bushels, value      -      -      £16. 16s.

3 qrs. 4 bushels *per horse.*

EXPERIMENT, N<sup>o</sup> 7.

Quantity eat by seven, in winter 1764-5.

26 qrs. 5 bushels, - - - £18. 7s.

3 qrs. 4 bushels *per* horse.EXPERIMENT, N<sup>o</sup> 8.

Quantity eat by eight, in winter 1765-6.

45 qrs. at 8s. - - - £36.

5 qrs. 5 bushels *per* horse.EXPERIMENT, N<sup>o</sup> 9.

Quantity eat by six, in winter 1766-7.

Till March 20th they had only carrots, (except when they went journeys);  
from thence to the 23d of May they eat of oats

	£.	s.	d.
5 Quarters at 14s.*	3	10	0
While at carrots they eat in their journeys 7 qrs. at 14s.	4	18	0
12 quarters,	8	8	0
2 qrs. <i>per</i> horse.			

EXPERIMENT, N<sup>o</sup> 10.

Quantity eat by ten, in winter 1767-8.

From the beginning of November to the middle of April they eat

28 qrs. 3 bushels, - - - £23. 0s. 9d.

2 qrs. 6½ bushels, *per* horse.

## OBSERVATIONS.

Reckoning the winter at 28 weeks for those years when the whole is taken;  
in, the horses eat *per* head *per* week as follows:

	bush.	pecks.
In 1763,	1	0
1764,	1	0

\* Some of them a secondary sort.

1765,

buff. pecks.

1765,	-	-	-	-	-	-	1	2½
1766,	-	-	-	-	-	-	1	3
1767,	-	-	-	-	-	-	1	0

Average, 1 buff. 1 peck.

Many people may think this a small allowance ; but with as much chaff as they will eat, I know by experience that a team will be properly supported. However if their work is uncommonly strong they should in that case have a larger portion.

C H A F F.

EXPERIMENT, N<sup>o</sup> 11.

Quantity eat by six, in winter 1763-4, from taking into stable to turning out.

That of four acres and an half of oats and seven of wheat, besides

	£.	s.	d.
1224 bushels of hay and straw cut ; value.	-	-	-
Cutting,	2	13	1
	2	13	1
	<hr/>		
	5	6	2

204 bushels *per* horse.

EXPERIMENT, N<sup>o</sup> 12.

Quantity eat by seven, in winter 1764-5.

That of 27 acres of spring corn and 9 of wheat, besides

754 bushels cut ; value, £3. 6s. 10d.

108 bushels *per* horse.

EXPERIMENT, N<sup>o</sup> 13.

Quantity eat by eight, in winter 1765-6.

That of 14 acres spring corn and 6 of wheat, besides

2176 bushels cut, £9. 3s. 8d.

272 bushels *per* horse.

EXPERIMENT, N<sup>o</sup> 14.

Quantity eat by six, in the winter 1766-7.

That of 2 acres of wheat and 48 of barley and oats ; none cut.

8 acres, 1 rood *per* horse.

In 1763,	•	-	204 <i>per</i> horse.
1764,	•	-	108
1765,	•	-	272

Average, 194 bushels, and 22 acres.

### C A R R O T S.

This root which is of such capital use to whatever stock it is given to, agrees with horses as well as any other food; and if used instead of oats; or a part of the allowance of oats saves prodigiously in the expence of winter keeping.

#### EXPERIMENT, N<sup>o</sup> 15.

In December 1765, compared, for three weeks, carrots with oats. I gave two bushels of carrots to one of oats; the horses so fed were, to all appearance, both at home and at work, in as good heart as those that had the oats.

#### EXPERIMENT, N<sup>o</sup> 16.

In February 1766, my horse-keeper desired to try carrots; he had a quantity at his command for a month; he gave them in different portions to his horses; to one alone, to another with a few oats, &c. His determination was that one bushel of oats was just equal to three of carrots: but herein I thought he exaggerated in favour of oats.

#### EXPERIMENT, N<sup>o</sup> 17.

Quantity eat by six, in winter 1766-7.

To March 20th they were fed with carrots. The method I took was to place a large box, about twelve inches deep, on a frame, just over the water of a pond before the stable, with a hole in it and a plug. In this box the carrots were thrown by two or three bushels at a time, and the plug being put into the hole, water enough to more than cover them heaved in; then the man washed them well, and very expeditiously with a birch broom, after which they were taken out and chopped in a trough with the edge of a shovel, and given the horses in chaff. They eat

304 bushels at 13d.	-	-	£16. 9s.
50 bushels <i>per</i> horse.			
14½ ditto <i>per</i> week.			
2½ ditto <i>per</i> horse <i>per</i> week.			

For long journeys they had a small allowance of oats besides.

EXPERIMENT, N<sup>o</sup> 18.

In March 1767, my horse-keeper (not the same as before) compared carrots with oats, and he was of opinion that two bushels and a half of carrots were equal to one of oats. This man had been used to them through the winter, and was grown fond of them, which allowed him to try them pretty fairly I believe.

## OBSERVATIONS.

That carrots are an excellent food for horses cannot be disputed; but the point which is most wanted to be set in a clear light is their comparative merit with oats. It appears evidently from N<sup>o</sup> 17, that a team of horses may be kept on carrots alone, for all work within six or eight miles of home. I allowed oats when they went out with corn, which is twenty-five miles. That winter my horses performed rather more work than usual, owing to my felling some acres of underwood; and yet they went through their work with as good heart, looked better, and were as free from disorders as at any other time, which is a proof that carrots may be substituted for oats. As to their being a more watery food, I think it an advantage at a time that the horses eat nothing but dry meat; this quality must add to their wholesomeness. They are given in plenty of chaff, of which I always allow my horses as much as they will eat, with hay always in the rack; so that they should rather be considered as an antidote to the dryness and heat of the other food.

Suppose at the price of a bushel of oats, carrots may be raised undoubtedly for 3*d*. a bushel (supposing the *profit* of the land not reckoned) which is eight bushels of carrots to one of oats. The growing price of oats is difficult to fix; with me that crop has been but little profitable, so that the real price and the growing one have been nearly the same; but call it 1*s*. 6*d*. then you have six of carrots for one of oats. Suppose it 1*s*. the proportion is then four to one, whereas the preceding experiments shew the equality to be two and a half to one —

But when the comparison is viewed in this light of appropriating a given quantity of land to the horses, and reckoning the expences alone of the productions which they consume, there is a further circumstance of much importance, though it will not admit of calculation, which is the nature of the crops and their culture relative to the state they leave the land in. Your horses consume twenty acres of land left in wretched order; whereas my five are probably the richest on the farm, and owing to the carrots: this difference is immense. It is for these reasons that I venture earnestly to recommend the use of so excellent a root to all who possess the land that will yield them: they will find it a most profitable management, that will vastly reduce the expence of horse keeping.



## S E C T. III.

## Of their GENERAL EXPENCES.

IT is only by knowing exactly the general expences of the team, that we are able to calculate the cost of the work it performs.

EXPERIMENT, N<sup>o</sup> 19.

Expences of six a year, 1763.

	£.	s.	d.
Hay, 10 ton, 17 cwt.	21	7	0
Oats, 20 qrs. 7 bushels,	16	16	0
Chaff, 1424 bushels,	5	6	2
Ditto of 11½ acres of corn, at 1s. 6d.	0	17	3
Four months at straw in the stable, at 9d. per week per horse,	3	12	0
Five months summer food, at 1s. 6d.	9	0	0
Farrier,	2	18	4
Shoeing,	2	3	0
Sundry small expences,	1	18	5
<b>10l. 13s. per horse,</b>	<b>63</b>	<b>18</b>	<b>2</b>

## OBSERVATIONS.

Upon this account it is necessary, in the first place, to explain why I deviate from my general plan of valuing nothing but what has a fixed and certain price; which is not the case with the chaff of a crop of corn, nor yet feeding horses in a stable on straw. I was induced to guess at these matters for the sake of rendering the table of expences complete; and especially as I was not in fear of any very material deviation from truth. The prices

prices I have charged I am confident are rather *under* than *over* the truth; but yet they are laid as near to the general prices of the country as I could proportion them. These accounts of general expences must be expected to vary greatly every year; but whatever variations happen, there will always result much use from knowing the average of several years.

EXPERIMENT, N<sup>o</sup> 20.

Expences of seven a year, 1764.

	£.	s.	d.
Hay, 7 ton, 15 cwt.	13	19	0
Oats, 26 qrs. 5 bushels,	18	7	0
Chaff, 754 bushels,	3	6	10
Ditto of 36 acres of corn,	2	14	0
Four months at straw,	4	4	0
Five months 3 weeks summer food,	13	2	6
Shoeing,	3	0	3
Sundry small expences,	1	3	3
<b>Sl. 10s. 11d. per horse,</b>	<b>59</b>	<b>16</b>	<b>10</b>

## OBSERVATIONS.

The expence per horse runs very low this year, owing to the small quantity of hay eat, and the freedom from illnefs of any kind; such years as this are to be expected very seldom.

EXPERIMENT, N<sup>o</sup> 21.

Expences of eight a year, 1765.

	£.	s.	d.
Hay, 15 ton,	37	10	0
Oats, 45 qrs.	36	0	0
Chaff, 2176 bushels,	9	3	8
Ditto of 20 acres corn,	1	10	0
14 weeks at straw,	4	4	0
23 ditto summer feed,	13	16	0
Barrier,	3	9	9
Shoeing,	3	16	5
Sundry small articles,	5	2	4
<b>14l. 6s. 6d. per horse,</b>	<b>114</b>	<b>12</b>	<b>2</b>

## OBSERVATIONS.

Hay and oats were this year excessively dear; the farrier's bill was no trifle, and the small articles ran very high; among others a horse lost, and advertised and cried; likewise the expences of buying two. But notwithstanding these circumstances, the amount is by no means more than must be expected in a series of years often to happen.

EXPERIMENT, N<sup>o</sup> 22.

Expences of fix a year, 1766.

	£.	s.	d.
Hay, 12 ton, 7 cwt.	27	15	6
Oats, 12 qrs.	8	8	0
Carrots, 304 bushels,	16	9	0
Chaff of 50 acres,	3	15	0
At straw 4 weeks,	0	18	0
Summer feed 26 ditto,	11	14	0
Farrier,	3	10	0
Shoeing,	4	11	4
Sundry small articles,	6	11	0
12l. 18s. 9d. per horse,		12	
In 1763,	10	13	0
In 1764,	8	10	11
In 1765,	14	6	6
In 1766,	12	18	0
Average, 11l. 12s. 3d.			

## OBSERVATIONS.

It is necessary to remark, that this table of expences is just <sup>an</sup> ~~an~~ transcript of my business, except the year 1767, as I was leaving the farm at Michaelmas, the winter of that year was not begun; so in the experiments of this work the prices of 1766 are taken, which makes no error, as I know from the prices of horse meat, &c. that the variation could have been but very small.

The reader must certainly remark that here is no charge for loss of horses, or for decline of value; the fact is, I suffered neither one nor the other; I lost no horse, and having an auction of farming stock in the winter of 1767, 8, I sold part of the team but; all were put up and bid for, so that I came to the value in the fairest and clearest manner in the world: and very remarkable.

able it is, that during the five years I had horses, I lost not a shilling by them; the advance in the value of two young ones paid me the loss I should have sustained by the rest; I bought and sold twice or thrice, but lost nothing: this is very common with farmers who make it a custom to do most of their work with colts, which they sell at five years old for coach-horses, who even make much money by their teams: but such men work them very lightly; whereas my horses scarcely stood still three days in a year, and were extremely hard worked, in which case it is unusual not to lose much money by them. However, there was no charging an imaginary sum for what I knew did not exist; and from my horses being free of the expence, I had great reason to suppose that many others were the same, which I thought sufficient to justify my making no such charge. The plan of this course of experiments is to state each matter as it really is, not to accommodate them by calculation to the general average of farms; because every experimenter should register his own facts, from which a general average may at last be drawn: but if each indulges himself in calculation, the whole would yield not an average of facts but of suppositions.

### Their H A R N E S S.

No article of expence that concerns the team should be omitted; the wear of horses harness is not a considerable expence, but it is not so trivial as to be left out of the account.

### C A R T H A R N E S S.

There are many different sorts of harness, but the best which are used in Suffolk are such as I am going to mention, with some variations immaterial to the reader.

#### EXPERIMENT, N<sup>o</sup> 23.

Cost of harness for six horses, 1763.

Each trace horse as follows:

	£.	s.	d.
One pair of traces,	0	10	8
Leather pipes to cover the traces against the horses sides; straps to go over his back, under his belly, and across his hips and crupper,	0	12	0
Fringed piece of broad leather to throw the rain off the horse's shoulders,	0	4	6
A collar,	0	3	0
	<hr/>		
	Carried over,	1	10 2
			Brought

	£.	s.	d.
Brought over,	1	10	2
A bridle halter,	0	1	6
The wooden pieces which are put around the collar, and to which the traces are fastened,	0	0	8
Irons to ditto,	0	3	3
Strip of leather which fastens ditto at top,	0	0	4
Stick which keeps the traces extended, and prevents them from rubbing the horses,	0	1	4

---

 2 1 3
 

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And for five, 10 6 3

The fill horse's harness is,	£.	s.	d.
Cart faddle,	0	15	0
Wood around the collar,	0	3	11
Collar,	0	3	0
Halter,	0	5	6
Strap which goes under his belly,	0	1	6

---

 1 3 11
 

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Add to this another fill horse's harness for a tumbril, 11 10 2

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 1 3 11
 

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 12 14 1
 

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EXPERIMENT, N<sup>o</sup> 24.

Repairs of ditto in a year, 1763.

Under the head of repairs are included all expences attending them: such as new collars, cart whips, fett sticks, straps, &c. &c. and mending and oiling, &c. &c.

	£.	s.	d.
These articles amounted to	0	11	9

EXPERIMENT, N<sup>o</sup> 25.

Repairs of ditto in 1764.

	£.	s.	d.
The above articles amounted this year to	0	8	11

EXPERI-

EXPERIMENT, N<sup>o</sup> 26.

	Repairs in 1765.	£.	s.	d.
The above articles amounted this year to	- - -	1	15	9

EXPERIMENT, N<sup>o</sup> 27.

	Repairs in 1766.	£.	s.	d.
These articles amounted this year to	- - -	0	17	8

EXPERIMENT, N<sup>o</sup> 28.

	Repairs in the first half year of 1767.	£.	s.	d.
They amounted to	- - -	1	5	0

EXPERIMENT, N<sup>o</sup> 29.

	In the last two years and a half the amount is	£.	s.	d.
	- - -	3	18	5

In that time the waggon and two carts performed the following work.

The WAGGON.

1. Journeys of 5, 6, or 8 miles, with coals, wood, manure, &c.	140
2. From 15 to 20 miles, - - - - -	12
3. At home, wood, straw, harvest, &c. - - - - -	122

The CARTS.

1. Journeys of 5, 6, or 8 miles with 2 horses, - - - - -	12
2. At clay, dung, &c. - - - - -	119
3. At gravel, stones, &c. - - - - -	35
4. At hay, &c. - - - - -	51

N<sup>o</sup> 1. of both waggon and carts may be joined, as the number of horses is the same; and N<sup>o</sup> 3, of the waggon, and N<sup>o</sup> 4 of the carts also, for the same reason. The account will therefore stand thus:

1. Journeys on the highway, - - - - -	152
2. The waggon from 15 to 20 miles, - - - - -	12
3. Journeys at home, hay, harvest, &c. - - - - -	173
4. The carts at manure, - - - - -	119
5. Ditto at gravel, &c. - - - - -	35
The	

The above sum of *3l. 18s. 5d.* divided among these journeys, in the proportions already used for the horses will stand thus.

						£.	s.	d.
N <sup>o</sup> 1.	152	at	2½ <i>d.</i>	-	-	1	8	0
2.	12	at	4½ <i>d.</i>	-	-	0	4	9
3.	173	at	1 <i>d.</i>	-	-	0	14	0
4.	119	at	2½ <i>d.</i>	-	-	1	1	0
5.	35	at	3½ <i>d.</i>	-	-	0	9	6
						<hr/>		
						3	17	3

## P L O U G H H A R N E S S.

### EXPERIMENT, N<sup>o</sup> 30.

Cost of harness for six horses, 1763.

	Each pair as follows :	£.	s.	d.
Two pair of traces,	- - - - -	0	9	2
Two back straps,	- - - - -	0	3	4
Two pair of those pieces of wood which go round the collars,	- - - - -	0	7	10
Two straps to fasten the ditto,	- - - - -	0	0	8
Two halters,	- - - - -	0	5	0
		<hr/>		
		1	6	0
		<hr/>		
And for three ploughs,	- - - - -	3	18	0

### EXPERIMENT, N<sup>o</sup> 31.

Repairs of ditto in the year 1763.

	£.	s.	d.
The wear of these articles amounted this year to	0	4	7

### EXPERIMENT, N<sup>o</sup> 32.

Repairs of ditto in 1764.

They amounted to	0	7	1
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EXPERIMENT, N<sup>o</sup> 33.

Repairs of ditto in 1765.

They amounted this year to - - - - - 0 17 8  
14d. each four acres ploughed and harrowed.

EXPERIMENT, N<sup>o</sup> 34.

Repairs of ditto in 1766.

They amounted this year to	£ s. d. 7 0
<i>-d.</i> per acre ploughed and harrowed.	



## S E C T. IV.

## Of the Work performed by them.

**W**ITHOUT knowing, with some certainty, what is the general quantity of work that a given number of horses will perform, there must remain great darkness on this important article in husbandry, which in this respect is extended over a variety of others. There is not in the whole range of economical calculation a point more undetermined than the expence of plowing an acre of land, which in different counties varies from half a crown to twelve shillings; and no satisfactory authority can be given in any place for the respective sums charged, but a general idea, that it is nearly the value. And it must be apparent that in any experiment to charge a clean earth at half a crown, when it really costs the farmer four or five shillings; or *vice versa*, must be productive of nothing but error, and unless an exact register is kept of every day's work in the year, this point cannot be cleared up. I much regret that I did not begin this minute register sooner, as one or two years will be far from deciding the matter: it must be the medium of several that alone can come near to the desired accuracy. It is needless to observe, that no comparison can be made between horses and oxen, unless the respective work of each is perfectly well known: since, to know what a team of either costs in the year, is of but little consequence, unless we likewise know the value of the work performed by both.

EXPERIMENT, N<sup>o</sup> 35.

Work performed by six in a year, from March 1765, to March 1766.

Ploughed 270 acres.

Harrowed 421 ditto.

Rolled 131 ditto, (when two horses are used it is doubled.)

Journeys

Journeys on the high road with hay, wood, &c. or for coals, manure, &c. five, six, or eight miles, four horses, 72 days.

Ditto fifteen or twenty miles, five or six horses, 4 journeys.

Ditto five, six, seven, or eight ditto, a cart and two, 10 days.

At turnbril at home, clay, dung, compost, &c. five or six horses, 62 days, 1105 load, or 18 *per diem*.

Ditto at gravel and stones, six horses work at hay, 21 days.

Harvest, wood, haulm, straw, &c. three, four, five, six horses, 35 days, light work.

Cost of the above work.

The reader by turning to Part III. of this Chapter, Experiment, N<sup>o</sup> 3, he will perceive they were kept at the rate of 14*l.* 6*s.* 6*d.* *per* horse, which for six is *£*.85 19*s.* 0*d.*

Which sum is therefore to be divided in prices of the above work; which I have done as exactly as my experience of the different degrees of fatigue which horses undergo at the respective works will allow me.

	<i>£.</i>	<i>s.</i>	<i>d.</i>
Ploughing 270 acres at 2 <i>s.</i>	27	0	0
Harrowing 421 acres, or 42 days work of two horses 3 <i>s.</i> 6 <i>d.</i> } <i>per</i> day,	7	7	0
Rolling 131 acres or 8 days work of one horse at 10 <i>d.</i>	6	8	0
72 journeys 4 horses at 5 <i>s.</i> 6 <i>d.</i>	20	0	6
4 ditto at 12 <i>s.</i>	2	8	0
10 ditto at 2 <i>s.</i>	1	0	0
62 days at 5 <i>s.</i>	15	10	0
21 ditto at 8 <i>s.</i>	8	8	0
35 ditto at 2 <i>s.</i> 6 <i>d.</i>	4	7	6
	86	7	8

This division brings it nearly to the sum; and those who are conversant with labour of this kind I apprehend will not think the allotment unequally made.

Work performed by six, in the year 1766.

Ploughed 238 acres.

Harrowed 391 ditto.

Rolled 153 ditto.

Journeys of five, six, or eight miles with four horses, 43 ditto.

Ditto fifteen or twenty miles five or six horses, 7 ditto.

Ditto five, six, seven, or eight miles, with a cart and two horses, 7 ditto.

At tumbrell at home, dung, clay, &c. five or six horses, 45 ditto, 88½ loads or 19 *per diem*.

Ditto at gravel and stones, six horses, 7 ditto.

Ditto at hay harvest, wood, straw, turnips, &c. &c. at home, three, four, five, or six horses,\* 90 ditto.

#### Cost of the above work.

My horses cost me this year 12*l.* 18*s.* 9*d.* each, which is for the fix 77*l.* 12*s.* 6*d.* Now as the *proportions* of the prices last year are supposed to be just, it is necessary to follow them here, but to vary each in proportion to the variation between the total work and total expence, and this must be done by the application of the rule of three to each article. The result is as follows :

	£.	s.	d.
Ploughing 238 acres at 2 <i>s.</i> 1 <i>d.</i>	24	7	0
Harrowing 391 or 39 days work at 3 <i>s.</i> 7½ <i>d.</i>	7	1	6
Rolling 153, or 10 days at 10 <i>d.</i>	0	8	4
43 journeys at 5 <i>s.</i> 8½ <i>d.</i>	12	5	6
7 at 12 <i>s.</i> 4 <i>d.</i>	4	6	4
7 at 2 <i>s.</i>	0	14	0
45 at 5 <i>s.</i> 2½ <i>d.</i>	11	14	6
7 at 8 <i>s.</i> 4 <i>d.</i>	2	18	4
90 at 2 <i>s.</i> 7½ <i>d.</i>	13	0	0
	76	15	6

This division brings it to within 17*s.* of the truth, which in the whole amount is a matter of little consequence.

#### OBSERVATIONS.

I will not pretend to assert that a most minute accuracy attends every one of these registers; but I am confident that the deviations from reality are very trifling. This plan I offer to the publick, rather as a hint for those cultivators to profit by, who minute their experiments, than as the complete exertion of the idea. Nothing of this sort was ever yet laid before the public; which I apprehend may be owing to a supposition of the trouble being very great; but this is not the case; a very little attention to method makes it easy and familiar. At night I minute the work of the day; and if I am absent, my bailiff or upper servant does the same; this is all the trouble necessary for gaining the real expence of tillage and carting, instead of the imaginary charge of the country.

\* Horse-hoeing, &c. I have reckoned as ploughing, and called each journey of a pair of horses an acre, and calculated the proportion of trench ploughing.

## S E C T. V.

## O F O X E N.

**T**HE great expence of keeping horses, the many accidents to which they are liable, and their trifling value when age or lameness renders them useless for draught, induced me to make a trial of oxen; a practice not followed either in Norfolk, Suffolk, or Essex, except by Lord Clare, at Gosfield-hall, and the success he met with never was the occasion of any one farmer following the example. I procured four stout oxen, that had been used to work, out of Lincolnshire; these arrived with me in October, 1765; but as the beasts were of no use without yokes, bows, &c. and full instructions how to manage them, I went to Lord Clare's to gain what information I could on every point concerning their use. Mr. Warner, his steward, a very intelligent person, and free from most vulgar prejudices, very civilly gave me all the information I could desire, caused his team of six oxen to be yoked and put to work, ordered one to be shod, that the blacksmith (whom I carried with me) might see the method, and lent me a yoke of each sort, and a bow for a pattern to have others made by them.

He informed me that his master had used them, I think six or seven years, with uninterrupted success, for all manner of work; ploughing; carting all the earth in some improvements in his park; rolling it; and bringing all the coals used in his family from Colchester and Malden at the distance of nineteen miles in a broad wheel waggon with six of them. He assured me that at any work an ox did as much as a horse; that they loaded them the same as they usually had done horses, and generally drove them three or four years; that since their first set, which his lordship bought in Gloucestershire, he had broke them all in, in which he did not find so difficult a task as I might imagine; that he fed them in winter with nothing but good hay; and from very accurate observation and experience he was absolutely certain that oxen were kept at much less expence than horses; and that any work might be cheaper

performed by them. He said that the practice was extremely ridiculed by the generality of farmers, who would never be brought to believe that they would do equal work with horses, or be kept at less expence.

The ox-house which his lordship had built for them was very complete; it was divided into above twenty stalls, with a rack and manger each, and a chamber for hay over the whole. The stalls were so wide that an ox might with ease turn himself in them to his water, which ran from a pump in a small stream on brick-work by every ox-stall about three yards out of the house inclosed in pales. The common custom in the ox countries is to cast the oxen for shoeing them; but Lord Clare's were all shoed in a small pound, the shape of the ox, with a hole the size of his neck, in a slider between the two end posts, by which means the danger and trouble of throwing was entirely avoided. To conclude, Mr. Warner lent me a labourer used to oxen, and I hired a boy that had often drove his. I returned very well satisfied with my information; determining to put in practice, as far as was in my power, what I had seen.

I had a straw house at one end of a barn with large double doors into my farm yard; I made but little use of it, and as there was a large hay-chamber over that, and a cart-house adjoining, I determined to convert it into an ox-house: accordingly I fixed a rack and manger, and divided it into four stalls, in the same manner as Lord Clare's was done, but had no room for their water, which want I was obliged to remedy by frequently driving them to the pond. I had bows, yokes and goads made, with the requisite chains, and a pole to my waggon, and built a pound at my blacksmith's for shoeing them.

	£.	s.	d.
The carpenter's work and materials in making the stalls in the house, the manger, and the rack, came to	2	15	6
Ditto the pound,	1	16	2
	4	11	8
Pole and wings to the waggon,	9	16	0
	5	7	8
The oxen cost me 32/.			

On using them in my waggon I found that one (the largest of the four) was absolutely worthless for drawing, inasmuch that the other three carried the whole weight: I tried him several times in the plough, but in every thing he proved an absolute jade; which unlucky circumstance prevented my using them in the waggon, so that I was reduced at once to only one plough or a yoke which I kept at work however constantly.

Relative to their summer food I have only to observe, that it differed in no respect from that of the horses. I turned them into both natural pastures and clover, and tried them various times on lucerne mown and given in their house; this food I think they did with, to the full as well as any other, and the profit of keeping them on it is undoubtedly very great; it is for every reason so extremely expedient that I can never omit recommending to every person who uses either horses or oxen, to take especial care to have lucerne enough to keep them all.

EXPERIMENT, N<sup>o</sup> 37.

Winter food of two, 1765-6.

Fed upon hay during the month November; upon straw in December, January and February. Then again upon hay, till they were turned to grass May 12th.

	£.	s.	d.
They eat of hay 4 tons, 10 cwt. at 50s.	11	5	0
3 cwt. per ox per week.			
3 months at straw, at 1s. each per week,	1	4	0
	12	9	0

## GENERAL EXPENCES.

EXPERIMENT, N<sup>o</sup> 38.

Expences of a yoke a year, 1766.

	£.	s.	d.
Hay, 4 tons, 10 cwt. at 50s.	11	5	0
Straw (See Part II.)	1	4	0
Summer food 23 weeks, at 5s.	5	15	0
Shoing,	0	6	6
Sundry small articles,	0	2	11
	18	13	5

9l. 6s. 8d. per ox.

## OBSERVATIONS.

The reader doubtless observes that the oxen happen of the dearest year in the whole five for their hay; had that article been at a moderate price the expences would not have amounted so high; and yet they are considerably lower than those of the horses; but chaff, oats, physic, &c. &c. run up the horse.

horse account greatly. The difference between the prices of their summer food is as great as it can be laid, if any thing, I think the oxen proportionably higher than the horses.

## THEIR HARNESS.

### EXPERIMENT, N<sup>o</sup> 39.

Oxen plough and cart with the same gears, which is a great advantage in point of saving expence. I made at first for my four oxen four yokes, one for the wheel oxen in the waggon, and two others for the fore ones in the waggon, or for common ploughing on the flat, and another shorter than the rest for other ploughing. The price

	£.	s.	d.
The wheel-wright the four, - - - - -	0	16	0
The blacksmith for iron-work, - - - - -	0	14	0
	1	10	0
Which is each - - - - -	0	7	6
Two bows, - - - - -	0	0	4
The iron pegs to ditto, - - - - -	0	2	0
The chain by which they draw the plough, or the four oxen the waggon, cost - - - - -	0	7	0
Per plough, - - - - -	0	16	10

The chain serves both waggon and plough, therefore the price might be divided, but I have charged the whole together.

## WORK PERFORMED.

### EXPERIMENT, N<sup>o</sup> 40.

Work done by a yoke in a year; 1766.

They ploughed 212 acres of land; the cost of which is the amount of their general expences, or 18*l.* 13*s.* 5*d.* That is 1*s.* 9*d.* per acre.

## S E C T. VI.

## Comparison of HORSES and OXEN.

**T**HIS is one of the most important points in the management of a farm; the advantage undoubtedly lies on one side or the other; or at least it must be clearly the most beneficial practice, when two teams are kept, for one to be of oxen; but in whatever path the fact lies, no one has yet explored it: every opinion that is heard is mere opinion, unsupported by experiment; general experience is fallacious; mistaken ideas, prejudice, the custom of the country, all have a strong effect in warping a farmer's judgment, when he guides himself by what he calls *experience*: farmers who cultivate fine light soils, and yet at this day reject the turnip husbandry, conduct themselves by *experience*; the same experience guides those who prefer horses to oxen; and others who approve oxen alone; but such experience is delusive; that alone is valuable which is founded on EXPERIMENT: the line and compass should be as often in the hands of an experimental farmer, as in those of a mathematician; and the scales and weights as familiar to him as to a chemist. I wish it was in my power to fill this chapter with numerous and varied experiments, but my practice has been too small to permit it; I can only draw up a comparison from the accounts of a single year, complete indeed as far as it extends; but by no means sufficient to draw those clear and indubitable conclusions, which a connected series of experiments can alone furnish.

EXPERI-



EXPERIMENT, N<sup>o</sup> 41.

Comparison of a pair of horses, and a yoke of oxen, 1766.

Expence *per* acre of ploughing with horses.

	£.	s.	d.
Horses general expences,	-	-	-
Wear of harness,	-	-	-
	0	2	1
	0	0	0½
	0	2	1½

Ditto with oxen.

	£.	s.	d.
General expences,	-	-	-
No wear and tear. But another expence, which must be	0	1	9
minuted, is that of a driver; this cost me	0	0	3
	0	2	0

Oxen superior by 1½*d.* *per* acre.

Upon this comparison it is to be remarked, that although no wear is here charged to oxen, yet in a term of years some small matter should be allowed for new bows; but then the amount will be so extremely small, as to admit of no annual division; the yokes and chains are invulnerable; at least 6*d.* *per annum* I should think sufficient to answer all their expence. But there are circumstances much more material than these in favour of the oxen. In the first place I am not at all clear that much smaller ones would not plough an acre a day, as well as these, which fatted up to between 80 and 90 stone, (14*lb.*) and if so, the expences would be much lower; for 2*s.* 6*d.* *per* week summer food, is in Suffolk vastly high, and was reckoned upon account of the large size of the beasts; the deduction of 6*d.* or 1*s.* *per* week would make a material alteration in the account. Next it should be remembered, that oxen admit of no suppositions of unspecified expences, which cannot be reduced to calculation; such as the decline in value of horses, and the losses by death and lameness; for as they are kept at work, ~~but~~ four or five years, and always changing by rotation for fattening, none of these losses can be laid to their account, which with horses would, in the register of twenty years experience, amount perhaps to 20 *per cent.* The ox is never worn out and consigned to the kennel; he is not subject to one tenth of the disorders of the horse, and if accidentally he receives a hurt, he is only turned to fattening sooner than usual. Thirdly, it should be observed, that in the expences of attendance for feeding, dressing, cleaning, &c. there is no comparison between

tween them; servants in Suffolk will not take above five horses under their care; and many no more than four; nor will they do any business whatever after the ploughing, &c. of the day is over, but attend their horses; and this in many months of the year takes up a large portion of the man's time. From the *observations* I have made, I am inclined to think every horse costs one penny *per diem* in this attendance, which in a year amounts to a matter of importance and division *per acre*; but I omit that, as it is not experimentally asserted. All the attendance my oxen took was now and then cleaning out their house, and when they came in, forking down their racks full of hay from the chamber above; my ox boy was not a tenth employed with them; he could have taken care of ten or twelve with the utmost ease; the difference between a man to five horses, and a boy to ten oxen, is very great.

Upon the whole, as far as we can depend upon the experience of one year, and upon the reflections which naturally arise from it, there appears great reason to think that ploughing with oxen is much cheaper than with horses.

END of the THIRTEENTH BOOK.



EXPERIMENTAL  
AGRICULTURE.

BOOK XIV.

Of the Implements of Husbandry.

T t t t

BOOK



## B O O K XIV.

## Of the Implements of Husbandry.

**T**HE variety in the implements used in agriculture is so great, that a person who speaks of plowing, harrowing, rolling, drilling, horse-hoeing, carting, &c. &c. offers no clear idea, unless he explains the instruments he used: every one varies in different counties, and even in the different parts of each county. This book therefore I do not add as a description of new inventions of my own, but merely as an explanation of many passages in the preceding experiments, wherein mention is made of operations in tillage: such passages must be somewhat obscure without a slight sketch of the implements I used; and it is absolutely requisite to state the expence of the first purchase of each, and the annual repairs; without such minutes the general expences of tillage cannot be determined.

## S E C T. I.

## Of the Suffolk Swing Plough.

THIS is a very small plough, with a curved mould-board, never drawn in this country with more than two horses, the same man holding and driving, and the usual work is an acre a day; it will cut any depth, if strength enough of draught is given; but the common depth is about five inches.

EXPERIMENT, N<sup>o</sup> 1.

## Cost of three,

Built the first in March 1763, and the second in July following; the third in February 1765.

## Cost of the first.

					£.	s.	d.
Wheelwright,	-	-	-	-	0	6	0
Blacksmith,	-	-	-	-	1	10	0
					<hr/>		
					1	16	0

## The second.

					£.	s.	d.
Wheelwright,	-	-	-	-	0	6	0
Blacksmith,	-	-	-	-	1	11	6
					<hr/>		
					1	17	6

## The third.

					£.	s.	d.
Wheelwright,	-	-	-	-	0	6	0
Blacksmith,	-	-	-	-	1	9	0
					<hr/>		
					1	15	0

EXPERI-

EXPERIMENT, N<sup>o</sup> 2.

Repairs of three a year, 1765.						£.	s.	d.
Wheelwright's work and wood,	-	-	-	-	-	1	2	0
Blacksmith,	-	-	-	-	-	4	3	4
						<hr/>		
						5	5	4

Ploughed 270 acres this year; the above sum divided gives 4½d. per acre.

EXPERIMENT, N<sup>o</sup> 3.

Repairs of three a year, 1766.

Repairs of three a year, 1766.						£.	s.	d.
Wheelwright,	-	-	-	-	-	1	2	2
Blacksmith,	-	-	-	-	-	3	16	5
						<hr/>		
						4	18	7

Ploughed 238 acres of land this year; the above sum divided gives 5d. per acre.



## S E C T. II.

## Of the IRON PLOUGH.

**I**N Mr. Dickson's treatise on agriculture, mention is made of an iron plough in Scotland, but as he has given no plate of it, I know not of what kind it is, nor ever saw any other plough of iron, but that of which I am about to speak. It is the invention of William Brand, a very ingenious mechanic at Barton, in this county, by a trade a blacksmith.

EXPERIMENT, N<sup>o</sup> 4.

In the spring of 1766 first bought one of these ploughs. The price 3*l*. 3*s*. I have observed its working with all the attention possible, to enable me to perceive whether it excels the common one of wood; and from all I can observe, I am clearly of opinion, that the draught is much easier; I may venture to assert, easier by half a horse: I never had a common one that would take so good a hold of the earth, in the article of deep ploughing; which is an additional proof of the easiness of its draught; for a common one to cut so deep would fatigue a pair of horses greatly. There is another point of great importance, the repairs; I have been careful in keeping an exact account of these, that a fair comparison may be made between the different kinds of ploughs.

EXPERIMENT, N<sup>o</sup> 5.

Repairs a year, 1766.

Only blacksmith's work; it required nothing but pointing, &c.  
the share and coulter,

<i>l</i> .	<i>s</i> .	<i>d</i> .
1	11	10

Ploughed 212 acres, which is not quite 2*d*. per acre.

EXPERI-

EXPERIMENT, N<sup>o</sup> 6.

Repairs half a year, 1767.

	£.	s.	d.
The amount,	0	5	10

Ploughed 31 acres, which is 2½*d.* per acre.

Comparison between the wooden and the iron ploughs.

The mean wear of three wooden ploughs in two years and a half, was found to be something better than	-	-	-	5 <i>d.</i> per acre.
That of the iron one,	-	-	-	2 <i>d.</i>
The latter superior by	-	-	-	3 <i>d.</i>

Which is a gain of 2*l.* 13*s.* only in ploughing of the above 212 acres. A contrast so striking and decisive, that greater satisfaction can scarcely be wished. Almost the total cost of the plough being gained in a single year, in superiority over the same sort in wood, is a vast difference.

Whoever has had much experience of wooden ploughs, must be sensible, that the expence of repairs is exorbitant: a man is but a little time in business before he finds his wooden plough is like a ship, that retains the name when not a plank first christened remains. This has been the case in my short experience; but with the iron plough it is totally different. Some farmers in this neighbourhood have had them several years without a penny expence, except the share and coulter. In a word, the excellence of the instrument is so undoubted, that I cannot but recommend it earnestly to the attention of all farmers who would execute their work as clear as they can.

## S E C T. III.

## Of the Double Mould-Board Plough.

**T**HIS is a common implement in Suffolk, for ridge work; the single plough draws out the work into *barks* as it is called, and then the double one follows, and shuts them up, completing the ridge; in which work it executes as much as two single ploughs; they use but two horses in it. The form is exactly the same as the single plough, except having two mould-boards, and the share two corresponding wings.

EXPERIMENT, N<sup>o</sup> 7.

## Expence of building one.

Wheelwright,  
Blacksmith,

£.	s.	d.
0	8	4
1	12	3
<hr/>		
2	0	7
<hr/>		

Repairs too trifling to mention.

## S E C T. IV.

### O F     H A R R O W S.

**I**N Suffolk only two sorts are known, the harrow for flat work, and that for the three feet ridges.

#### EXPERIMENT, N<sup>o</sup> 8.

Made one in the autumn of 1765, the frame so arched as to clasp two ridges, each a yard over. The price was,

	£.	s.	d.
Wood work, - - - - -	0	8	4
Iron ditto, 38 teeth, &c. - - - - -	1	0	0
	<hr/>		
	1	8	4

#### EXPERIMENT, N<sup>o</sup> 9.

Repairs of ditto in two years and a half.

	£.	s.	d.
Wheelwright, - - - - -	0	2	4
Blacksmith, - - - - -	0	1	0
	<hr/>		
	0	3	4

H A R R O W with bent teeth.

The first mention I have met with of a harrow with bent teeth, was in the *Essays on Husbandry* in the description of the Swedish harrow: the idea pleased me much, and as I had need of a new one, when I first read that ingenious work, I directed it to be made with crooked teeth.

#### EXPERIMENT, N<sup>o</sup> 10.

In 1765 first made it. It consisted of two harrows linked together, each of them four foot long, and three feet six inches broad. They had each five bars and four cross ones, and thirty-three teeth so disposed as to cut in different directions. The teeth in the first bar were strait: those in the second

U n u z

bent

bent forwards like a rake; the third bent sideways; the fourth forwards, and the last strait. I ordered handles to be fixed like those of a plough, but the harrow was too heavy for two horses when leaned upon, so they were useless. But for very deep harrowing they must be of great service.

The price of this harrow was,					£.	s.	d.
Frame,	-	-	-	-	0	13	0
Two whipple-trees,	-	-	-	-	0	0	8
Teeth, and other irons,	-	-	-	-	1	19	0
					<hr/>		
					2	12	8

In June, on my turnip land, I made trial of this harrow, with an exceeding good common one, borrowed of a farmer; they both passed over each a fearch twice; and marking the fearches, I called several workmen to give their opinion which was the finest, and they all decided in favour of that which was worked by the harrow with bent teeth. But working the land fine is not the only benefit resulting from it; it buries seed incomparably better than strait teeth can, as I have often experienced.

EXPERIMENT, N<sup>o</sup> 11.

Repairs of ditto in two years and a half.					£.	s.	d.
Wheelwright,	-	-	-	-	0	2	1
Blacksmith,	-	-	-	-	0	1	6
					<hr/>		
					0	3	7

EXPERIMENT, N<sup>o</sup> 12.

Cost of another, 1765.					£.	s.	d.
Frame,	-	-	-	-	0	15	6
Whipple-trees,	-	-	-	-	0	0	8
Teeth, and other irons,	-	-	-	-	2	6	10
					<hr/>		
					3	3	0

EXPERIMENT, N<sup>o</sup> 13.

Repairs of ditto in two years.					£.	s.	d.
Wheelwright,	-	-	-	-	0	1	0
Blacksmith,	-	-	-	-	0	0	4
					<hr/>		
					0	1	4

## S E C T. V.

## O F R O L L E R S.

**N**ONE of these are used in Suffolk, except the barley roller, and what they call the ridge roller, which bellies in the middle, to crush the clods in the furrows of three feet ridges.

It is impossible to do without the barley roller; for the rolling of spring corn sown on stretches (broad lands) I never yet knew a farm without it.

EXPERIMENT, N<sup>o</sup> 14.

In March 1763, I made one; the diameter of the roll (cut out of an oak) was 14 inches, the length 8 feet; it was fixed in a frame by an iron bolt at each end, which being let into a groove in the end pieces of the frame, turned on it. Shafts were fixed across the frame, for the horse to draw in. The cost,

	£.	s.	d.
Wood and work,	1	11	0
Blacksmith,	1	5	0
	<hr/>		
	2	16	0
	<hr/>		

In five years use it cost nothing in repairs.

The ridge-roller is for rolling land when on ridges of three feet broad; it is made bellying in the middle to crush the clods in the furrows.

EXPERIMENT, N<sup>o</sup> 15.

Made one in January 1765, length 4 feet 9 inches, diameter of the center 1 foot 7 inches; no shafts. Cost.

Wood

	£.	s.	d.
Wood and work,		1	3 0
Blacksmith,		0	17 0
		<hr/>	<hr/>
		2	0 0

Never had any repairing.

### THE LARGE FALLOW ROLLER.

#### EXPERIMENT, N<sup>o</sup> 16.

I never experienced the use of a very heavy roller for breaking the clods of a fallow until the summer of that extremely dry year 1765, when I was much troubled in pulverizing the field P. for turnips. I rolled it with the steath roller, but found it ineffectual, and not having time to wait for rain, I thought of putting two horses to my pasture roller, and going over the field with it; this I executed accordingly, and found it to answer extremely well, crushing innumerable clods which the other passed over without breaking. This success induced me afterwards to pursue the same practice, and I always found it of admirable use. There will be no impropriety in describing it here, instead of forming an article for pasture implements; besides, it is of a more peculiarly proper size for this work, as rolls cannot be too heavy for grass lands. It is 5 feet long, and 2 feet 6 inches diameter, with heavy shafts. I did not build it; but the expence of such an one new would be

	£.	s.	d.
Wood and work,		4	0 0
Iron and ditto,		2	3 0
		<hr/>	<hr/>
		6	3 0

It was an old one when I had it, but never wanted any repairs.

## S E C T. VI.

## Of the D R I L L P L O U G H.

THE only drill plough of which I have had any experience is Mr. Randal's : I do not attempt the least description of it, as he has published a very particular one in a quarto volume.\* But as I have from experience several remarks to make on it, I shall suppose the reader to turn to that account of it, before he examines my observations, as he cannot possibly understand any thing that is said on the subject without the plough itself or the book before him. I shall first, however, state the purchase and repairs.

EXPERIMENT, N<sup>o</sup> 17.

	£.	s.	d.
The plough and packing cost †	8	18	6
The Repairs,			
Wheelwright's work at trifling jobs,	0	13	9
A new wheel,	0	10	6
Screws, brads, nails, &c.	0	7	8
Bolts, plates, and other irons,	1	3	4
Blacksmith's time,	0	7	6
	3	2	9

The defects I particularly remarked were;

I. The receptacle of the seed, being the circular bowl upon which the hopper rests; and in which the wheel turns, is so deep that no seed will be well thrown out without half or three-quarters of a peck being put in. If you

\* *A description of an universal seed furrow plough.*

† Besides freight and carriage.



want to sow two ounces of lucerne, for instance, you must put five or six pounds in, to sow it properly ; this, in small experiments where the exact quantity of seed is to be known, is troublesome and vexatious.

II. I found the central part of the frame, through which the middle drill goes, so weak that I was obliged to strengthen it by screwing a plate of iron from it to the lower frame, to keep the former steady.

III. The frame through which the harrow teeth are let, was so weak as presently to split. I strengthened it with three plates of iron.

IV. The mere weight of the machine at work broke the axle-tree twice. It was mended by splicing with screws, but will not hold long.

V. The wheels are so weak, that one of them is fairly broke in pieces ; the other will last some time longer.

VI. I found the central frame upon which the hoppers are built so weak (being unconnected with the upper frame upon account of regulating the depth of sowing) that when half a bushel of pease or wheat was in the hopper, I expected every jolt would break it down ; and some of the joints of that small central frame did start and give, so that I was forced to rivet them all with iron, and join the lower bowl, in which the wheels move, by two iron rods to the frame of the plough for steadiness ; I screwed them that they might be moved occasionally.

VII. The circular edging of wood nailed on to the above-mentioned bowl, to confine the hopper, flew in pieces perpetually, until I rivetted them with iron ; nor did the hopper screws keep it tight, till I made new ones much larger.

VIII. The leather sliders are a very incomplete contrivance, for I could never regulate the quantity of seed by them at all, but was always forced to stop the holes in the little mahogany plates which let into the bottom of the bowl, when I wanted less seed to come out ; nor had I any other way of regulating these holes, but putting seed in the hopper and turning the wheels before the plough went out, and so calculating the quantity to the circumference of the wheel ; but this is a tedious business, and impossible for common farmers.

IX. The harrow teeth that came with the plough were presently bent double ; but by means of fresh plating they have stood.

X. The wooden pipes which convey the seed from the bowl to the tops of the shares have been perpetually breaking ; nor will they be tolerably in order till I have new ones made of tin.

XI. With the utmost attention to the use of the plough, I could never bring it to shed any sort of seed without a man walking close behind it within the handles to watch the shedding, and when stops happened, to give a stroke upon the hopper with his fist : without this precaution I am confident many yards in an acre would remain unsown. I can attribute it to no-  
thing

thing but the holes in the mahogany pieces not being of the due size, or to a want of power in the wheel to throw the seeds out. However, as two people must attend the working it, this fault I easily excused ; tho' in a large tract of ground it would be inexcusable.

Upon the whole, the principal fault of this plough is its weakness, and a want of being firm and compact in its several parts ; the very working of it without any accidents in my fields, and after good ploughing too, broke some part or other every journey we took with it. The principle upon which it is constructed is a good one, and I am confident that an ingenious workman could make one from it that would answer all the purposes of strength and accuracy. My carpenter here, who is very quick and ingenious, insists upon it that he could make me one that would do for the *stiffest* lands, and yet have all the powers of this, and I believe him. But I would beg leave to recommend such improvements to the inventor, Mr. Randal, who certainly deserves much praise for going so far, and than whom none can be more capable of rendering it perfect. I have been thus free in pointing out the defects, from candour to the public, and am clear that that gentleman had much rather submit his machine to the examination of those who really use it, than have it possess a reputation not founded on experiment.

If it be said that other drill ploughs have been invented which answer better, and have precluded the use of this criticism ; I reply, that I am informed new drills are every day inventing, but none that answer well, inasmuch that a very penetrating and ingenious experimenter refers us to Tull's as superior to the rest. It is therefore probable that more will come out, in which case the inventors cannot have too clear an idea of the defects of former ploughs.

## S E C T. VII.

## O F H O R S E H O E S.

## The C O M M O N P L O U G H.

**A**LL I have to minute under this head, is a remark that I found the common plough to be by far the best horse hoe I used or could invent, and apparently more useful, and better adapted to most of the purposes of the operation, than any of those complex machines delineated by Tull or his foreign imitators. As the great intent of horse hoeing is the pulverization of the moulds in the intervals between the rows of plants, thereby destroying, at the same time, the weeds, and exposing fresh surfaces to the atmosphere, it is evident, that nothing can better effect these ends than turning ridges of moulds backwards and forwards, by striking furrows with this plough in the intervals, and this may be very effectually performed in the breadth of three feet four inches; easier and completer, indeed, than in others of four or five feet, because a bout or two furrows should always be able to lay open a wide furrow in the center of the interval, which cannot be done in wide ones, unless a broad strip be left again the plants untouched. This part of horse hoeing I always performed with the common plough, and found it answer the purpose so well that I never wished for any other implement for the purpose.

## The D O U B L E M O U L D - B O A R D P L O U G H.

At the last horse-hoeing, when I wanted to leave the furrow in the centre of the intervals quite open, and struck clear from moulds, I drove this plough once through them, for which purpose it answered very well; and this is all the use I have made of it in horse hoeing.

## The CULTIVATOR.

I made one of these instruments from M. de Chateauxvieux's single cultivator but without the fore carriage, with a swing beam and a Suffolk ear. For very narrow intervals it answered tolerably, in loosening the earth; but I cannot recommend it in general. The price

	£.	s.	d.
Wheel-wright,	0.	4	6
Blacksmith,	0	16	0
	<hr/>		
	1	0	6*

\* Besides these implements I used a drill harrow, arched to the form of a five feet ridge drawn by two horses, one in each furrow. This instrument is so necessary that it cannot be done without.

## S E C T. VIII.

## IMPLEMENTS of CARRIAGE.

## The W A G G O N.

**T**HERE are material variations in the construction of waggons in different counties; but of all those I have seen, none I think equals the Suffolk one for containing very large loads in the buck (body), for strength, and a facility of turning corners. In Essex their harvest waggons are better than the Suffolk ones; for by means of what they call their *false standards*, which are poles set off on each side, about eight inches from the buck, but parallel with it, the men are enabled to lay on more corn in the straw, or hay, and at the same time with greater ease, whereas the four semi-circular pieces which are fixed on the Suffolk waggon, with the same intent, are mere nothings.

EXPERIMENT, N<sup>o</sup> 18.

In the spring 1763, built one. The length of the buck within eleven feet and a half, the breadth four feet. Weight complete 1 ton, 6 cwt.

Cost,	£.	s.	d.
The wheelwright's work, stuff, and painting,	11	19	8
The blacksmith,	£.	s.	d.
Tire, 26 score and 2 lb. at 6s.	7	16	7
Other irons,	7	5	2
	15	1	9
	27	1	5

EXPERIMENT, N<sup>o</sup> 19.

Repairs of ditto the two first years, 1763 and 1764.

	£.	s.	d.
Plates for the axle-trees (called in Suffolk <i>clouts</i> ) *	0	8	0
Other repairs,	0	2	11
	0	10	11

\* Though I put this article among the repairs, yet it is not properly the wear of the waggon; it is of the same nature with the expence of grease for the wheels.

EXPERIMENT, N<sup>o</sup> 20.

Repairs of ditto in 1765.

Axletree plates,  
Other repairs,

£.	s.	d.
0	10	3
0	7	8
<hr/>		
0	17	11

EXPERIMENT, N<sup>o</sup> 21.

Repairs of ditto in 1766.

Axle-tree plates,  
Other repairs,

£.	s.	d.
0	10	8
0	17	0
<hr/>		
1	7	8

EXPERIMENT, N<sup>o</sup> 22.

Repairs of ditto half a year, 1767.

Axle-tree plates,  
Other repairs,

£.	s.	d.
0	5	3
0	4	3
<hr/>		
0	9	6

At the end of the two first years I desired the wheelwright and two farmers to value it, that I might know exactly the cost of the use of it. They fixed it at 22/. At Michaelmas 1767, the end of the above half year, they valued it again, 10/. 10s.

EXPERIMENT, N<sup>o</sup> 23.

Repairs and decline of value of ditto in four years and a half.

Repairs the two first,  
Damaged by use,

£.	s.	d.
0	10	11
5	7	5

Repairs in two years and a half,  
Damage by use,

£.	s.	d.
2	15	1
11	10	0

<hr/>		
14	5	1
<hr/>		
20	3	5
<hr/>		

In the year 1765 this waggon went

72 journeys five, six, or eight miles, with wood, coals, manure, &c. &c.

Four ditto from 15 to 20 miles.

Twenty-five ditto at home, wood, straw, harvest, hay, &c.

In 1766 it went of the first 42, of the second 7, and of the third 65.

In the half year 1767 it went 25 of the first, 1 of the second, and 32 of the third.

In all, of the first,	140
Second,	12
Third,	122

In dividing the expence of the waggon during the two years and a half among these journeys, I do not imagine that I can follow any better rule than the proportions already made use of in Book XIII, Chap. IV. Sect. IV. Experiment N<sup>o</sup> 35. and 36. as the labour of the horses, and the wear of the carriage are in direct proportion to each other. In the following division this proportion is exactly followed.

	£.	s.	d.
140 at 15. 3d.	8	15	0
12 at 20. 10d.	1	14	0
122 at 7d.	3	11	0
	14	0	0

Which brings it very near to the truth of the whole sum, and gives the exact expence of the waggon at those works.

### The T U M B R I L.

In the spring of 1763 I built a tumbril, new except the wheels, having bought a second-hand pair of broad wheels (without a tire upon them). I bought at the same time a second hand cart for 5/. I shall proceed on these implements in the same manner as I did with the waggon, by stating their expence, and the work they performed, to determine the proportion between both: their not being new is no objection to this account, as the value at first and last is taken.

#### EXPERIMENT, N<sup>o</sup> 24.

	£.	s.	d.
The wheelwright's stuff, and work of the new tumbril came to	2	14	4
Blacksmith's ditto,	1	11	8
Wheels,	1	1	0
	5	7	0

The second hand one, 5/.

EXPERI-

EXPERIMENT, N<sup>o</sup> 25.

Repairs of the two in two years, 1763 and 1764.

	£.	s.	d.
Axletree plates,	0	4	9
Other repairs,	1	3	3
	<hr/>		
	1	8	0

EXPERIMENT, N<sup>o</sup> 26.

Repairs of ditto in 1765.

	£.	s.	d.
Axletree plates,	0	3	11
Other repairs,	0	11	8
	<hr/>		
	0	15	7

EXPERIMENT, N<sup>o</sup> 27.

Repairs of ditto in 1766.

	£.	s.	d.
Axletree plates,	0	5	7
A new pair of broad wheels and tire,*	4	16	0
Other repairs,	1	15	3
	<hr/>		
	6	17	3

EXPERIMENT, N<sup>o</sup> 28.

Repairs of ditto half a year, 1767.

	£.	s.	d.
Axletree plates,	0	2	3
Other repairs,	2	1	10
	<hr/>		
	2	4	1

At the end of the two first years they were both valued by the wheelwright and two farmers, who fixed the two at 7*l*. At Michaelmas 1767, the end of the above half year, they valued them again at 10*l*.

\* The old ones quite worn out, and worth nothing but the boxes and hoops, which were put into the new ones.



EXPERIMENT, N<sup>o</sup> 29.

Repairs and decline of value of ditto in four years and a half.

	<i>£.</i>	<i>s.</i>	<i>d.</i>
Repairs the two first years,	1	8	0
Damaged by use,	3	7	0
	<hr/>		
	4	15	0
	<hr/>		
Repairs in the last two years and a half,	9	16	11
Increase in value,	3	0	0
	<hr/>		
	6	16	11
	<hr/>		
	11	11	11

In the year 1765 these carts performed,

- 5 journeys (10 of one) of five, six, or eight miles.
- 62 at clay, dung, and compost work.
- 21 at gravel and stones.
- 5 (10 of one) at hay, harvest, &c. &c.

In 1766 they did,

- Of the first, 3 journeys, (7 of one).
- second, 45 ditto.
- third, 7 ditto.
- fourth, 25 ditto.

In the half year 1767 they went,

- Of the first, 4 journeys.
- second, 12 ditto.
- third, 7 ditto.
- fourth, 21 ditto.

- In all, of the first, 12 ditto.
- second, 119 ditto.
- third, 35 ditto.
- fourth, 51 ditto.

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The division of the expence of these two years and a half among the above journeys, in the proportions used in dividing the expence of the horses, will be as follows :

	£.	s.	d.
12 at 3½d.	0	3	3
119 at 8½d.	4	4	0
35 at 1s. 1½d.	1	19	4
51 at 4½d.	0	18	0
	<hr/>		
	7	4	7
	<hr/>		

And this brings it to the truth, except 7s. 8d. in the whole, which is inconsiderable.

## END of the FOURTEENTH BOOK.



# A P P E N D I X.

**T**H E following sketch of a journal of the weather is very imperfect ; but it is nevertheless useful, to be able to see at one view the general cast of the seasons on the spot where the preceding trials were made : a longer course of practice would have made me more attentive in this particular, which certainly has its importance.

## W E A T H E R, 1765.

A week's frost in January, and about three weeks pretty sharp in February, with a snow of three and four inches deep, was of great service to all lands. The snow kept the wheat warm, and the frost greatly meliorated the fallows : the service done by hard weather to ploughed grounds is indisputable, even among farmers themselves ; yet many in this neighbourhood lost all the effects of five or six weeks frost by not ploughing up their stubbles, either through indolence, or for the sake of a little paltry sheep feed. The weather, ever since October last, was extremely favourable to the lands ploughed early : that month was without exception the finest of the year 1764. The end of September and the beginning of it, I turned up my wheat stubble, which having that fine warm weather on it, and the succeeding frosts, received great benefit, much more than would have paid me for ploughing the field, had I hired ploughs for that purpose.

The first fortnight in March was very unfavourable weather : cold winds, much rain, and morning frosts brought the wheats in all this neighbourhood to look extremely bad ; blue at the ends of the spires, with sharp points ; but the latter part of the month, and the beginning of April, the wind fixed in the west, the air mild and warm, the sun appeared often, and we had frequent growing showers ; the wheats recovered surprizingly, til-

Y y y 2

lered

tered out, and covered the ground with a fine verdure. From the middle of April, to the beginning of May, showery growing weather, which brought on the grass very thick at bottom: after which for a few days the weather was very fine. May 9th, came a prodigious heavy shower in the middle of the spring corn sowing, which bound several fields that were lately sown, so that they were forced to be harrowed again; but the land then to be sown worked the better for it, as I found in a field of oats I had. From that day, until the 23d, no rain fell at Bradfield; and during that time the want of it was felt in several respects. The grass was at a stand in its growth; and an acre of madder I had planted in March was so bound with it, owing to its deep ploughing, that the plants did not flourish so well as they otherwise would; the chief part of this time also a cold easterly wind blew at times, which seemed to me to have effect on the wheats, by the yellowish colour they had at this time. The rain that came, that and the three succeeding days, was only a few slight showers, which reached the roots of scarce any thing; nor were they very refreshing, as the wind changed to the north, and blew very sharp and cold. The 27th at night was a very sharp frost, which nipped almost every thing, particularly the clover, and killed all the cattle trod on, that night, that fed in it.

## J U N E.

The wind continued north and east, with several morning frosts, which did great damage to all tender garden plants. The spring corn came forward very slowly, and grew very yellow and sickly at the points. The sun very hot and burning. The 11th the wind changed to the west, with great appearance of rain and a tempest; a slight shower fell, but too trifling to have any effect; nor was there any other rain till the 14th, when it began raining about five in the morning, and scarce ever ceased till nine at night; it came very soft and gentle, but the next day I perceived it had penetrated four or five inches deep in some lands not very loose. From this time, till the end of the month, no rain fell at Bradfield, though much wanted, for sowing turneps.

## J U L Y.

All this month passed with scarce any rain, to the great detriment of the pastures and clover lays; mine were totally burnt up, in so much that four times the number of acres were necessary to maintain a stock of cattle than would have been in a favourable season. During this month I could get few turneps to grow, nor any of my neighbours. The barleys and oats on moist lands looked well, and the wheats remarkably so; my pease a very fine crop,

crop, and my tares better than I expected. But the young clover in the barley crop thin and shrivelled. Lucerne, sowed broad cast in April for transplantation, yellow and short.

## A U G U S T.

The drought lasted till the 13th of this month, when a night's fine refreshing rain fell, which soon showed itself in the verdure of all vegetables, and brought up my turneps, which had been sown just before. The weather soon cleared up, and turned very hot and fine, which lasted till the 30th, the wind changing to the south; when several slight showers fell, and continued the next and following days, till

## S E P T E M B E R.

The 3d, when several slight showers fell, but none of any great consequence; the drought continuing (except these showers) till the 18th, when it began raining at five o'clock in the morning, and lasted till four in the afternoon, also the chief part of the next day, and following days, which was attended with a fine effect to the turneps, which were backward for want of it. The latter part of the month was fair and pleasant, with now and then a shower.

## O C T O B E R.

Very heavy rains fell, with but short intervals, the beginning of this month; they were of general service in enabling us to plough our stubbles. Towards the end of it came moderate showers by night, with sunshiny mornings: ploughing up of stubbles went on without interruption; but delaying to ridge up summer fallows, I found them too wet, and was obliged to wait for drier weather. The young wheats early sown looked very well; but early sown turnips were during this month generally mildewed.

## N O V E M B E R.

The beginning of this month was open pleasant weather, generally fine sunshiny mornings, lowering afternoons, and heavy rains at nights. Towards the middle it grew yet more foggy and wet, insomuch that I was forced to desist for some time from throwing my summer fallows on to the ridge. There were a few frosty nights, sufficient to nip vegetables, and wither potatoe stalks. The 19th at night was a sharp frost, with a piercing north wind.

## JANUARY.

## JANUARY and FEBRUARY.

1766.

## WEATHER.

From the 23d of December, till the 20th of January, was a very sharp frost; it then thawed slowly till the first of February, on which day a fresh frost came, with a piercing north west wind, and froze on the second and third, as sharply as ever I remember, continuing till the 10th, from which time till the 14th was perpetual rain, sleet, snow, and high east winds. From the 14th fine mild, dry weather, but a few bad days towards the end of the month.

## CORN.

The wheats in general looked extremely well, till nipped with the east winds, when some of them turned blue at the points.

## CATTLE.

The cows and lean cattle in the farm yards did not look well during the dripping weather in the middle of the month, but they afterwards improved.

## M A R C H.

## WEATHER.

From the 1st till the 18th of this month was as fine weather as ever known at the season, a perpetual sun with scarce an obscuring cloud: a very sharp frost came the 20th; frost, snow, and rain, with north west and west winds till the end of the month.

## CORN.

I never knew the wheats in general to look better.

## TILLAGE.

During the extreme fine weather at the beginning and middle of the month, even my worst lands broke up perfectly dry and in moulds; but the plough was stopped at the end of the month by frost.

## DRAINING.

I was not able to get my hollow draining finished before the 25th. They kept the fields quite dry.

## CATTLE.

Never did better at the time of the year; the fine warm season, with scarce any north easters, was of prodigious benefit to them. but the want of turneps was severely felt by many farmers.

A P R I L.

## A P R I L.

## WEATHER.

This month was ushered in with exceeding heavy showers from the 1st till the 7th, wind S. W. Fine warm and pleasant, till the 17th, when it grew wet, with heavy showers. From the 21st till the 26th, fine and pleasant, then very hot and sultry, with an exceeding heavy shower in the afternoon, which lasted an hour, and was succeeded by a frost next morning. It continued showery till the end.

## CORN.

The wheats looked well; and the early sown beans came up very favourably.

## TILLAGE.

I could not get on to my lightest land to plough well until the 8th, and all the business of tillage went on very badly throughout the month. The 28th I was quite thrown out of all ploughing and harrowing, not having an acre of land but what was quite wet. The heavy shower bound all the fields that had been sown or harrowed. Many in the country were re-ploughed afterwards, merely on account of that shower; the lands that were left fine being turned quite to plaster.

## M A Y.

## WEATHER.

From the 1st till the 13th, perpetual rains, and on the 9th, and 12th, remarkably heavy; wind W. and N. E. From the 13th to the 18th, fine and pleasant; wind S. W. From the 19th to the end of the month, multitudes of showers, and some very heavy; wind N. and N. E.

## CORN.

The wheat continued to look well. The beans rose finely, in those fields that had been well water-furrowed immediately on sowing. The oats and barley, which a few farmers had sown the beginning of March, now looked exceeding well, and bid fair, contrary to general expectation, to be by much the best crops. Those sown in April wore a miserable appearance every where but on very light dry lands.

## CATTLE.

The lean cattle left the farm yards with a good countenance; the straw on which they had subsisted during the winter was very good, the preceding year having been so dry.

## TILLAGE.



## TILLAGE.

The terrible weather of the preceding month continuing, it was attended by the same effects. The 10th I was again thrown entirely off all my lands, and even on the 11th, 12th, and 14th was obliged to go on to the lands designed for turneps, the barley ~~off~~ being quite mortar. The 19th, 20th, and 21st, all my ploughing was a third time at a stand, and my barley nevertheless not all sown; in fine, it was the 24th before I finished my sowing. I made no doubt but such a seed time would be attended with a wretched crop.

## PASTURES.

It was the 10th of May before the pastures were ready for my horses: but I did not reckon that late; it is in cold dry springs generally much later. They looked extremely well, of a good verdure, and grew very fast all this month.

## ARTIFICIAL GRASSES.

By much the forwardest of these on my farm was the sainfoine; an experimental piece of which was ready to receive any cattle whatever with a full bite, by the first day of this month, much forwarder than any natural pasture a fortnight afterwards. My broadcast lucerne was nearly as forward, and of a most beautiful verdure: my clover notwithstanding it was most plentifully manured in the winter, was not near so early.

## J U N E.

## WEATHER.

Throughout this month it was fine, pleasant, cloudy, windy, and showery by turns, not six days together alike, the wind varying all round the compass perpetually.

## CORN.

The wheats rather fallen off from their appearance. The spring corn looked but indifferent, and all except what followed a most perfect fallow, very full of weeds, and the clover that was sown amongst it rose very formidably. The oats seemed better than the barley.

## CATTLE.

Neither cows, fattening cattle, nor horses, carried a good appearance, the grass was so perpetually wet that it did not afford the nourishment it yields in drier years. Many sheep died of the rot, and a vast number of others, on wet grounds, thrived but indifferently.

## PASTURES.

## PASTURES.

In rich lands they began to mow at the end of the month, and had a great crop of grass.

My sainfoine and lacerne, after growing surprizingly in the spring, fell off the beginning of this month, and grew but little. I did not mow some of them till the 24th, at which time the clover had overtaken them. This latter plant was every where a great crop.

## WEEDS.

I never beheld any thing equal to the appearance of weeds all over the country: numbers of fields were covered with yellow and white, the Charlock and May-weed made such a shocking appearance; in some fields the corn was not to be seen for them. Many of my fields were in the same condition. Never was there so much weeding before; the thistles likewise among the after crops were very numerous. My tares cost me *gs. 6d.* an acre thiffling, and my wheat as much for weeding.

## TILLAGE.

My fallows for turneps worked well, and the weeds rose so fast in them, and were so successively turned in, that I am in hopes of a clean crop of barley after the turneps.

## J U L Y.

## WEATHER.

The same as last month. Many exceeding heavy showers, with multitudes of smaller. I reckoned but thirteen days entirely free from rain, and many of those moist and hazy. Wind generally S. and W.

## CORN.

All in general except the oats and beans, and some fields of pease, looked but indifferently.

## TURNEPS.

I kept sowing all the month; the flies attacked some; three acres of mine they eat up, and threatened all: the hot gleams between the showers favoured the insects greatly.

## PASTURES.

I began mowing the third, and the weather was so excessive showery, that I was all the month about six acres. The crop very large. The pastures which were fed grew likewise very fast.

## ARTIFICIAL GRASSES.

I mowed some clover (a very great crop) the 3d. but it was too late, I should have done it sooner. The sainfoin and lucerne grew very fast, especially the latter.

## WEEDS.

These continued throughout the month to make a dreadful appearance.

## A U G U S T.

## WEATHER.

This month was in general very fine, warm, and pleasant; the 5th, 6th, 7th, 8th, 20th, 21st, and 22d, were exceeding hot days. As to rain, the 3d. there was a prodigious heavy shower, which laid much corn; besides which there was only five days that had rain. Wind varying through every quarter.

## CORN.

The very hot weather which came the beginning of the month, after so very wet a season, mildewed the corn. I examined many fields of wheat the 9th, and found them all much affected. The 14th in the morning the wind was N. W. in the afternoon it changed to the S. W. and brought up a thick stinking mist directly, which mildewed the wheats yet more, and likewise the barley and oats. Next morning some of my barley had lost a great deal of the brightness of the straw; from which appearance I perceived at some distance that it was mildewed. The beans looked exceeding well. The rye, in light lands, 6 or 7 miles from me, was begun to be cut the 3d, and some wheat in my neighbourhood the 12th. I began harvest by mowing tares the 6th. The 25th I mowed oats; the 26th cut wheat, and the 28th barley.

## TURNEPS

Grew prodigiously, and shewed plainly that they would be a good crop; the dry weather was very advantageous to the hoeing.

## CATTLE.

Cattle in general did well this month; the cows gave a plenty of milk considering the season; and the fattening beasts throve much better than they had done the preceding wet month.

## TILLAGE.

## TILLAGE.

I ploughed up a field of nine acres, that had been tares, and nothing could work in a more perfect tilth; but the wheat fallows were many of them, in the neighbourhood, cloddy. Three acres of my own I found no difficulty in keeping very fine.

## S E P T E M B E R.

## WEATHER.

The beginning of the month was excessively windy. The 2d and the 8th, there was very heavy showers; the 4th, 7th, and 10th, slight ones; and this was all the rain that fell during the month, the whole of which was exceedingly fine, warm and pleasant; the wind W. and E.

## CORN.

Harvest went on finely; nothing could be more favourable than the weather. I cut black oats the 10th, and beans the 16th.

## TURNEPS

Continued to thrive greatly during the whole month.

## TILLAGE.

I should have sowed wheat early in this month, but the weather was too dry; however I kept preparing for it by ploughing and harrowing; the land worked well, but not so fine as if rain had fallen.

## PASTURES.

The cattle of all kinds found plenty of food in the pastures, and looked very well; the fattening beasts thrived better than they had done before.

## ARTIFICIAL GRASSES.

Some of these grew very well notwithstanding the want of rain; my hogs found plenty of food in the clover, and thrived extremely. The lucerne was backward in its growth.

## O C T O B E R.

## WEATHER.

Very warm and pleasant till the 5th, when a heavy rain fell, and again the next day and the 8th. From the 12th to the 18th was fine clear weather with frosty mornings. After that to the end of the month in general pleasant weather, many days very fine. Wind generally W. and S.

## CORN.

Harvest was in general over the beginning of this month; I finished the 25th with feed tares.

## TURNEPS.

These fall off in their countenance greatly for want of rain: the 5th I observed them very yellow, and the caterpillars on some parts swarmed. I saw within a few miles a field entirely leafless with them. The rains however which succeeded stopped the evil, and they looked better towards the latter end of the month.

## TILLAGE.

The 21st I sowed wheat; the rains, which fell the beginning of the month, gave a fine opportunity for getting the land in perfect order; they were however in general too dry; but the piece I began on, laid on the flat, and was manured, both which circumstances added to the moisture. It was the 28th before the ridged lands were generally sown.

## CATTLE.

The fattening cattle continued to thrive, and the cows to give a tolerable quantity of milk, my aftermas feed held my fattening till the 23d, when I stalled them at turneps. The 22d. &c. the lean hogs were drove from clover and acorns to market, in very fine order.

## MISCELLANEOUS OBSERVATIONS.

This was a great acorn year, and they began to drop the 3d, and some high winds that came afterwards blew them down very quick.

The 23d, the lime and ash trees about half lost their leaves.

The 30th ash generally stripped; beech entirely; oak not at all.

## NOVEMBER and DECEMBER.

## WEATHER.

The weather during these months was in general extremely fine. We had many pleasant, mild frosty mornings, and the showers which fell were not attended with any disagreeable effect, being but few, and except the 8th of November, none violent. I scarce ever knew at that season so dry a time.

## CORN.

The wheats in general looked well, and those which were but just coming up, bid fair for giving a verdure soon.

## CATTLE.

## CATTLE.

Dairy lean cattle, and horses, are seldom left in the pastures so late as this year, there was a great plenty of feed half through December. Cattle in general healthy and well.

## WATERS.

The brooks and ponds were never known to be lower; what little rain that had fallen made no perceptible addition to their waters.

## PRICES.

Wheat from 22s. to 26s.

Barley from 10s. to 11s. 6d.

Oats from 7s. to 9s. 6d.

Hay 30s.

## TILLAGE.

The beginning of November, while I was ploughing and sowing wheat, I found some land so cloddy, that I was forced to use the great roller and a pair of horses, which crushed them all, and left the land for the plough exceeding fine. The 11th and 12th I ploughed up the clover land, and sowed it; nothing could work more crumbly and fine; a heavy rain the 7th was of great service: this was my last sowing.

## WOODS.

The 6th of November I began to fell.

## J A N U A R Y.

1767.

## WEATHER.

A very sharp frost set in the 1st, with a north wind; the 2d, a deep snow fell, and it continued snowing till the 7th; the 8th, it froze excessively hard, the 9th it snowed prodigiously, insomuch that it laid upon the ground on level places two feet deep, and five, six, eight, and ten feet deep where driven by the wind, which changed to the west, and even south, and the frost increasing in severity; it afterwards got again to the north, in which point it continued until the 22d, when a thaw came from the south, in which quarter it kept till the end of the month, with warm pleasant weather, and a few rainy nights.

## CORN.

The wheats be so buried in snow, received no damage from the frost. I sowed mine just before it came, and again on its going away, and was suc-

prized to find how good a countenance it wore : I thought it much come on, and greatly greener than it was, so it certainly grew under the snow. I had water-thoroughed my wheats effectually, and I saw the advantage of it, for after the snow melted they were presently quite dry.

#### TURNEPS.

These roots were likewise finely preserved from the frost ; when it went, I could not perceive they were the least injured by it.

#### CATTLE.

During the snow the sheep were all fed on hay, the turneps being too deep to be got at in large quantities, and they in general suffered but little. Lean beasts, and cows in the farm-yards at straw, looked in general well ; they never thrive better than in frosty weather. I had two large fat oxen at turneps, in stalls, which eat very heartily, and seemed to thrive as well as before the snow came.

#### PASTURES.

On the snow melting, the pastures became exceeding wet, but a most striking difference was to be seen between those which were hollow-drained, and others ; the former presently became quite dry, whereas the latter were almost covered with water in flat places at the end of the month.

#### WATERS.

I never knew the ponds on my farm so excessive low of water as before the snow came ; nor wet lands, at that time of the year, so dry ; but the melting of the snow filled every hollow, and made many ponds to overflow.

#### PRICES.

Wheat from 20s. to 24s.

Barley, at Bury, 12s. 9d. at Thetford 12s. 6d. and at Sudbury 13s. 6d.

Oats 9s.

Beans 14s.

Pease 14s. and 15s.

Hay at Bury, during the snow, 55s. after the thaw 35s. and 40s.

Turneps to feed off, 31s. at Thetford, to draw, 42s.

#### F E B R U A R Y.

#### WEATHER.

The whole month was in general fine and pleasant, with S. W. and W. winds, now and then veering for a day or two to the north ; but little rain.

CORN.

## CORN.

The wheats in general never looked better.

## TURNEPS.

The roots of the turneps continued perfectly sound and nourishing, and the tops carried an exceeding good verdure the whole month; they began to shoot about the 27th.

## PASTURES.

Notwithstanding so much snow falling, I scarce ever knew hitherto a drier winter: the wettest of the pastures were comparatively dry, and with a sound surface. My pasture G. was during this whole month drier than I remember it to have been at the time of the year.

## EXFOLIATION OF VEGETABLES.

I have already observed that the turneps began to shoot at the end of the month. The 16th and 17th I observed many snow-drops, crocuses, and hy-paticas in full blossom.

## PRICES.

Wheat from 20s. to 22s.

Barley from 11s. 6d. to 13s.

Oats 9s.

Beans 14s.

Tares 11s. to 14s.

Clover 20s.

Turneps to draw 30s. to 35s.

## M A R C H.

## WEATHER.

The first three days pleasant, but windy, and some rain the 4th, and thunder and lightening; from thence to the 15th, exceeding pleasant, dry, and sunshine; wind N. W. but rather cool. From that day to the 24th, snow, high winds at N. and N. W. and heavy showers; to the 29th, fine and pleasant, wind E. rain the 30th and 31st.

## EXFOLIATION OF TREES, &amp;c.

The first of this month the honey-suckles, E. exposure, full leaved. Nylacks full budded. Hypatica, crocus, and snow-drop in full blossom, S. exposure. The 11th, saw the first daisies. The 13th, gooseberries began to leave, S. exposure, sheltered from the N. and an apricot, ditto exposure, began to blossom.



## CORN.

The wheats continued to carry an exceeding fine verdure.

## TURNEPS.

By the end of this month they were run so high that it was by no means advisable to draw any more, as I left some for feed. They were two feet high. Most of the crops in the neighbourhood were either finished or nearly so.

## TILLAGE.

The beginning of the month the lands I viewed worked well; but after the rains came, much worse; I sowed beans throughout the month, and the field tilled much the best at first.

## CATTLE

Throve in general exceeding well; indeed so great a plenty of good fodder is in almost all seasons attended with that effect.

## PRICES.

Wheat from 24*s.* 6*d.* to 26*s.*

Barley from 12*s.* to 13*s.*

Malt 16*s.*

Oats from 8*s.* to 9*s.* 6*d.*

Beans from 11*s.* to 14*s.*

Pease from 13*s.* to 14*s.*

Clover seed from 15*s.* to 21*s.* *per* bushel.

Tares 12*s.*

Hay 30*s.* *per* ton.

Cattle taken into straw and turneps, 1*s.* *per* week.

Turneps to feed off at the end of the month, 35*s.* *per* acre.

All sorts of cattle excessive dear.

## A P R I L.

## WEATHER.

The first fortnight of the month mild, showery, growing weather, wind N. E. and W. From the 14th to the 21st sharp, frosty, cold winds a E. From thence to the end moist and cloudy, but in general cold; wind N. E. and E.

## EXFOLIATION of TREES.

The 3d, violets in blossom, S. exposure; and the 1st, white thorn leaves. The 5th Tackomahack and Larch, and Syringoes full leaved; Lylacks nearly; all rich soil and S. exposure. The 6th, primroses blossomed; 29th, Dog Orchis in blossom.

## CORN.

The wheat looked exceeding well in general. The beans rose well.

## PASTURES.

All the upland pastures I noticed were very backward.

## ARTIFICIAL GRASSES.

All were in general backward. The 25th, the clovers were in general not above two or three inches high; transplanted lucerne about ten, and burnet broadcast seven.

## TILLAGE.

I sowed barley, oats, and pease throughout the month, and never remember the lands to work in general better: the whole month passed without a single violent shower, which makes mortar of those lands which are in tillage, and the frequency of which ruined the crops of spring corn last year.

## PRICES.

Wheat from 25s. to 28s.

Barley from 11s. to 13s. 6d.

Oats 9s.

Pease 13s.

Clover seed from 19s. to 24s.

Cattle increasing in price.

## M A Y.

## WEATHER.

From the 1st to the 8th, cold and high winds, with some sleet and showers; wind N. and N. W. From thence to the end of the month very cloudy, with some fine days, and several of rain. The 17th, 18th, 26th, 29th, 30th, and 31st, continued rain, but not violently heavy.

## EXFOLIATION.

The 8th, hazel; 15th, some oaks began to look a little green.

## CORN.

Wheats never looked better, and the spring corn rose exceeding well.

## PASTURES

Continued backwarder than ever I knew them.

## ARTIFICIAL GRASSES

Likewise very backward. I never failed turning my horses into a full bite of clover the 12th of this month, but it was not high enough for my hogs.

this year. I cut some burnet the 23d, and lucerne the 25th, which for those early grasses is very late.

## TILLAGE.

I finished my sowing the 7th, and never knew, on the whole, a better seed time.

## PRICES.

Wheat 24s.	Hay 30s.	Mutton 4d.
Barley 13s.		Beef 3½d.
Oats 9s.	Malt 16s.	Pork 4d.
		Veal 5d.

Cattle dearer and dearer.

In the east riding of Yorkshire as I understood by letter.

Wheat 32s.

Rye 20s.

Oats from 8s. to 10s.

Beans 13s. 4d.

Malt 18s.

Hay 15s. *per* load.

Mutton and beef, 4d. and 4½d. *per* pound.

Pork 4d.

Veal 2½d.

A good cow and calf, eight or nine guineas.

A pair of five years old oxen, lean, from 20*l.* to 22*l.*

Three years old steers 13*l.*

Horses and sheep excessive dear.

Spring pigs a guinea, such as usually half ditto.

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